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A
MINISTRY OF HEALTH
AND OTHER ADDRESSES



Medical N.R.

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MINISTRY OF HEALTH

AND OTHER ADDRESSES.

BY

BENJAMIN WARD RICHARDSON,

M.D., F.R.S., M.A., LL.D., F.S.A.,

FELLOW OF THE ROYAL COLLEGE OF PHYSICIANS AND HONORARY PHYSICIAN TO THE
ROYAL LITERARY FUND.

NEW YORK:

D. APPLETON & COMPANY,

549 & 551 BROADWAY.

1879.



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In Memoriam

TO

ROBERT WILLIS, M.D.

FOR THIRTY YEARS A BELOVED FRIEND, COUNSELLOR

AND FELLOW WORKER

THESE ADDRESSES

IN REMEMBRANCE OF HIS LEARNING, VIRTUE,

COURAGE, AND AFFECTION

ARE MOST SINCERELY AND REVERENTLY

DEDICATED

PREFACE.

THREE of these addresses, published originally in the 'Gentleman's Magazine,' having been often called for, are supplied in this volume, together with six others dealing with allied subjects.

The first address, on *A Ministry of Health*, was delivered before the Sanitary Institute of Great Britain, at the Stafford Congress of the Institute, in October last, and was intended to invite attention to one of the most pressing reforms of the day. The favour with which the address was received by almost all sections of the public press leads me to hope that the time is near when the legislative bodies will find the subject it discusses worthy of earnest consideration.

I have been much gratified by the kind notice

that has been taken of the third address, entitled *A Homily Clerico-Medical*. This address, which was delivered in St. Paul's Cathedral as one of the Trophy Room lectures of the Homiletical Society, and which was first published in the *Clergyman's Magazine*, is an attempt to show the points of contact of two of the leading learned professions. The subject it broaches is also one for the future; and if I have opened it ever so slightly for serious discussion the labour will be well rewarded.

The eighth address, on the *Registration of Disease*, was delivered as far back as 1862, before the Social Science Association. It relates to a subject on which I had then been labouring for several years, at much cost and with little success. The time now seems opportune for getting the plan suggested in the essay carried out on a complete scale under central and Governmental direction. When this is done, and not until then, we shall begin to be sanitary reformers in deed as well as word, for we shall begin to study disease in its entirety, in its habitat, and in its season.

In the address on *The World of Physic*, which formed an inaugural to one of the Sessions of the

St. Andrews Graduates' Association, and in each of the other addresses, I have tried either to point a new suggestion that may be of practical service, or to bring into notice, in plain and simple language, some matter of information that has not as yet become knowledge in common.

12 HINDE STREET, W. : *January 1, 1879.*



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I.

A MINISTRY OF HEALTH.

WHENEVER the question of legislative procedure is brought forward in England, we have to consider in relation to it two distinct orders of mind, the centralizing and the self-governing. These orders of mind have no necessary reference to what is called party feeling. They are neither Whig, nor Tory, nor Radical. The designations of party are the mere designations of sets of men who are struggling to rule. The orders of mind, centralizing and self-governing, are the natural components of the national character, and exist in all the parties. To the foreigner this peculiarity of the English character is perplexing beyond measure. He can make nothing of it. One of the shrewdest of Frenchmen, who, during the rule of the Empire, lived in England, and who was a politician of the purest kind,—a politician by talent as well as by learning,—told me this was the difficulty of difficulties to under

stand. He would adduce examples. "There is such and such a member of Parliament for a Radical borough; a Radical of the deepest dye; a Radical amongst Radicals, who lived in the days when that almost forgotten book, the 'Radicals of Marylebone,' was written, and who might have written the book. That man is as great a centralizer as 'Napoléon le petit' himself. There is another member of Parliament for a Tory borough, who talks of nothing but the glory of the British constitution, and the horrors of the Radical programme. Yet he is in dead enmity to everything that partakes of absolute authority, local or general; is opposed to every movement in the vestry of his parish that savours of improvement; and would not let another Act of Parliament pass if he could possibly prevent it."

This was the tone in which my logical French friend spoke of us islanders; and no doubt he spoke with perfect correctness of us, as we presented ourselves to him. We were peculiar and contradictory to him, if words could be trusted, in respect to our principles of political action. Principles of policy are not, in fact, the principles by which we are moved and by which we move.

The simple truth is, that the impulses which lead us to action are in our natures, and move us independently of our professions, which, being accidentally

acquired, are always secondary influences. It is necessary, therefore, in thinking of legislation, not to think so much of party as of the primary motives of those who make up the nation, and of what the nation is likely to permit and is likely to put to the test of practice.

Computing by this test, there are, I think, very few thoughtful people who would try any legislation for England that had in it much of a centralizing disposition. If the mind of the nation could be fairly tested as to its desires, I should say that three out of four would prefer the self-governing to the central method in any measure that might be proposed, even though the measure had reference to the dearest of all interests, the first of all interests,—the health of the nation, in its individual and collective state. We have not, it is true, had much experience on this point ; for the genius of the nation, by which term I mean the special or particular tendency of the nation, has run counter to experiments that would lead to experience. But, whenever we have, in a small way, gained an experience from a political experiment in which central authority has been the source of power, the result has, perhaps without an exception, been, at best, but partly successful. At this moment, in relation to sanitary work, there are in operation two measures eminently promising in

regard to the good they are likely to effect for the health of the people: yet no two measures could be more intensely opposed—opposed not by Whigs, Tories, or Radicals specially, but by men who at the election booth vote entirely differently, and who represent the most conflicting party interests.

I make these observations as a preliminary to the subject proper of my present discourse. Amongst sanitarians there is now actively enkindled an enthusiasm which has never before been witnessed in any other country, and never before in this country. The health topic is the social topic of the hour, the leading subject of discourse through all society. In one of the most unsophisticated fishing villages of this kingdom, in a village on the outskirts of the kingdom, in a village where the people rarely see it necessary to go abroad to find mates for marriages and where they seem all to be one family, in a village in which of all others I should, by passing through it, have least expected to find the light of sanitary science,—in that remote and simple place there occurred recently a death, said to have been from typhoid fever. I, being in the village at the time as a tourist, heard, by accident, of this death from the post-mistress, in whose house I found a friendly retreat during a heavy shower. In an almost automatic method I asked, as the fact reached me, what was

the mode in which the houses of the place were drained. Judge my astonishment at hearing, in reply, from my informant, that the case in question could not be connected with drainage; that it was not a case of typhoid fever from special contagion conveyed by water; that it was a case of fever after confinement, which had assumed a typhoid character; that the water supply of the place had no communication whatever with the sewage; that although such communication was now known to be commonly present when there was an epidemic of typhoid, the place I was now in, bad as it looked, was safe from an outbreak of typhoid fever from that cause; but that she could not say so much for it if typhus should occur, since typhus was disposed to travel by the air and, if it did break out, would probably find a great many victims, the ventilation of the houses being very bad. Judge further my surprise at her conclusion, that the villagers, although they were not rich nor much educated, nor much in the way of the world, were quite aware of what was necessary to preserve the health of the community; that they had no kind of superstitions, as their fathers and mothers had, about diseases being necessary evils and that nonsense; and that if they could not build a model town, they could at all events go on improving what they had got.

Such homely facts as these show how the current of popular opinion goes at present on the subject of health, and affords, at one and the same time, a reason and an excuse for the zeal and enthusiasm of those who are in the first rank of the sanitary advance. To them the temper of the nation seems to be towards some design that shall transform projected measures for perfecting the health of the community into practical working measures, and that shall make men and women and children the sanitary salt of the earth, not by your leave and with your leave, but by subpœna and at your peril.

Against this conception I am anxious, before I proceed further, to raise my voice. Few men have been longer in the trained service of sanitary science than myself. Few men have followed more closely the development of that science. There is scarcely one large lecture-theatre in the kingdom in which I have not taught some sanitary lesson. There are few earnest sanitarians of the day with whom I have not held communication or exchange of knowledge and opinion. And, if from all these experiences I am able to form a judgment of any kind that is definite, it is, firstly, that nothing has so much forwarded the great progress we have witnessed during the past quarter of a century as the perfect freedom of action that has been permitted; and

secondly, that nothing more disastrous at this stage of our course, or possibly at any stage, could occur, than the interposition of a central authority that should attempt to enforce even the wisest of rules on the community by serving it with a subpoena to attend even to its health. Nor have we far to seek for the reasons of this. The reasons are simple because the problem of health is simple ; because so very little requires to be done to reach what is perfect ; and, because all that has to be done is so easy to be done, that to inflict on the most willing people any heavy yoke of authority would be the exercise of an unwarrantable and complicated instrument of force. When at this very time we, as practical sanitarians, look at the conditions of our houses and our towns, and at the social state of the masses of the people ; and, when from that picture we turn to the tables of mortality, our wonder is, not that we suffer so much, but that we are half so healthy as we are. With that wonder we take in at a glance an appreciation of the fact, that the extension of the most obvious and childish rules of self-preservation would accomplish almost everything that could be accomplished, and that what is demanded now, when the weight of superstition is removed, and every man feels that disease is a burthen he carries on his own shoulders, is education, with time to give it room to

turn in, and freedom to give to it readiness and facility of action.

These observations as to the development, past, present, and future, of the science of health may sound at first singular as a preface to an address which has for its promise the consideration of the duties that belong to an officer of the State who is to be called a Minister of Health. There is, however, nothing in what I have said that is opposed to the appointment of such an important officer of the State, while out of what I have referred to there is overwhelming argument to be found for his creation, at as early a date as is possible. My object in the preface has been to indicate at once that any officer placed in the central position to which attention is drawn, must be an authority, not a disciplinarian; a judge and director, not a commanding officer; a collator and teacher of all learning relating to health, not a dogmatic professor; an interpreter of the laws which bear upon health, not an officer of justice enforcing them on the community. He should, in a word, be to the people what the judge is to the jury and to the officers of justice who bring up cases for judgment or carry out the verdict.

As with the judge, the Minister of Health would soon find there are sufficient numbers of laws for all purposes if they were only enforced under proper

direction. For himself, instead of asking to be invested with special powers of a legal kind, it would rather be his duty to investigate the mode of action and value of the many laws which are at present in force ; to determine which are useful and practical, which useless and cumbersome ; and to advise the Government on the subject of a complete and revised code for sanitary administration, local and imperial.

A minister so constituted as to his duties and powers would come into office without prejudice. If he did not quite meet the views of the small minority who would crave for centralising powers as a part of his official functions, and who, in their zeal for the sanitary cause, would create a fatal *imperium in imperio*, he would, as a central authority, meet their ideal of the necessity for his existence, and, in the end, would probably suit them better than if he were armed with powers which he might, in the exercise of his supreme mercy, inflict on themselves. To the members of the great majority, which I have called the self-governing, he would be acceptable without fear. They would listen to his direction calmly, because the power to act would rest with themselves ; and they would be more likely, from that very circumstance, to submit to his directions, and to act in accordance with his recommendations.

If it be asked what evidence there is that a public

officer, placed as I have indicated, would be of any effective service to the community, I answer that the most notable evidence of the kind that has ever been recorded is to be found in the career and work of the officer who, in the year 1838, was appointed under the name or title of the 'Registrar-General of Births, Deaths, and Marriages.' When, in another century, the history of English sanitation comes to be written, the historian will find in the returns of the Registrar-General the kernel of sanitary science in England during the past forty years. Each week the daily papers publish from those returns an abstract at which now all England glances, and on which all thoughtful England speculates, in relation to questions of health. By that record towns are put on their mettle to compete for the best health, in a manner which no mandate from a central government office, charged with power to enforce, could ever produce. By that record every sanitary improvement is tested and shown at its true value, so that the masses of the people are directly influenced by it. The Registrar-General is a judge, not a ruler. He merely puts the case, the jury rules; and if, in many instances, its ruling may be poor and faulty, it is in the right direction, and, what is above all price of computation, it day by day improves.

These returns, moreover, do more than affect the

masses ; they affect a smaller and yet most influential class, the thinking part of the nation, the cerebral part, if I may so express myself. From these returns mortalities have been extracted, and causes of mortalities specially traced. From them the dark regions of disease in the land have been discovered, mapped out and demonstrated at a glance, as counties and towns are demonstrated. From them influences of seasons on diseases are made manifest. From them the relation of occupations to the duration of life of the occupied has been deduced. From them the relation of birth to death has been wrought out with a precision which Arbuthnot and Halley, with all their prescience, could hardly have dreamed of. I do not mean to claim for these returns that they are perfect. I do not mean to say that they explain all anomalies and all coincidences. I do not claim that the annual reports founded on them by their officers, —remarkable state documents as those are which bear the honoured name of William Farr,—are all that could be wished. But, taking the work of the Registrar-General's department for forty years, I do mean to say that it has no parallel ; that it has served a purpose of good far beyond all expectations of it ; that it is the finest piece of contemporary vital history that has ever been written ; and, that we, the representatives of health and science in this day.

could not have been the scholars of health we are, if those papers had not been our treasure trove.

The facts of one department are, it seems to me, the natural proofs of what in England, and it is no business of mine to speak for any other country, can be effected by official direction of intelligence. I am led thereby, as from a minor to a major consideration, to the study of the new office of a Ministry of Health.

Is there any requirement for such a Ministry? will be the first question that comes forward. We have rapidly progressed as we have proceeded so far without such a Ministry, and we found, during the short time that we had a President and an acting Board of Health, no great satisfaction in that experiment. Why should we move at all into that which is new and problematical?

The answer to this is, that we must move, because we cannot remain as we are. We have piled up such a number of sanitary valuables, we do not know how or where to lay our hands on them when we want them. We have a library without a librarian or a catalogue, I had almost said without a shelter. Until we get a house with an orderly department and an official direction, we can have no system in our work; while day by day, with an increasing public intelli-

gence, the work becomes harder and a systematized plan of it the more absolutely necessary.

At this time there are half-a-dozen Ministers of Health, and half-a-dozen boards with a number of intelligent men, some of the highest intelligence, acting practically as clerks, doing sanitary work which clerks could well do, and chafing under the infliction of labours which have no satisfactory end. The President of the Local Government Board is one of these ministers; the Secretary of State for the Home Department is another; the Registrar-General is a third; the Chief Commissioner of Works is a fourth; the Lord President of the Privy Council is a fifth; and the President of the Board of Trade is a sixth. There is not one of these important State functionaries who has not something to consider bearing on the health of those whose interests he superintends; while some of them have more sanitary details to consider than any other. I name these officials specially, leaving out of sight, but not out of mind, the heads of the Army and Navy Departments, the Postmaster-General, and the semi-governmental President of the Metropolitan Board of Works.

But with all this multiplication of officers connected with particular parts of the sanitary service, we have no one reliable Minister of Health. Not one to whom application can be made for immediate and

distinct information ; not one from whom information is issued that is complete in its bearings; not one who is ready at any moment to furnish the Government of the day with the data by which it could come to a decision in the event of any great crisis affecting the health of the people ; not one to whom the people would pay an instant and a willing deference.

It is a Minister and Ministry able to carry out these duties that is now required, and to the creation of which our attention should be devoted.

BASIS.

The basis of a Ministry of Health is already laid. I do not think there can be two opinions on the subject, that the basis lies with the office of the Registrar-General. That office, amended in name and in function, supplies all that is required as a nucleus. The work of estimating life and death which now goes on there is the true foundation of all our efforts. This work ought to remain as the foundation. It may admit of being improved and widened, and some think that it ought to be. I have nothing to say on that matter, except that, if all else were half as good and perfect, we should be in the way of rapid and safe progress.

It is by modification of, and additions to, this department, as it now exists, that the new official and governmental institution for which I plead should be

established. The modifications and additions are not, after all, many; and they are, I believe, all practicable. They would introduce nothing actually new, but would bring together what is already extant. The department would be no longer for mere registration, but would include all that relates to health. Correctly re-named, it would be a Ministry of Health, or a State Department for Health. The shortest and at the same time the most distinctive title would be the Ministry of Health; and in accordance with this the head of the department, instead of being called the Registrar-General, would be called the Minister of Health. There is a great deal in securing this title. It would give dignity to the office, and would fix the office in the minds of the people as an office which they understood and which they respected; an office closely associated with all that is of most vital interest to them and to theirs.

CONSTRUCTION AND DUTIES.

The construction and duties of the Ministry of Health would lead to several divisions of labour.

I. *Registration.*—In addition to the duty of collecting the registrations of births, deaths, and marriages, the Ministry of Health would collect the registrations of disease throughout the kingdom. A complete system of registration would be estab-

lished, and the returns supplied by it would include not only the diseases affecting human kind, but the diseases affecting animals and plants in every locality. By this means the leaders of public opinion and knowledge would every hour have at their command the facts of the state of health of the entire country. By a very simple arrangement and extension of the information that has been already collected by the geological survey, the local natural history of each district could be appended to the returns, so that the relations of disease to local conditions could shortly be known with precision, and philosophically discussed.

II. *Meteorology*.—To the same Ministry the reports of meteorological conditions would be duly sent from all the observatories. In this manner the relations of meteorological states, embracing of course those pertaining to season and climate, would be connected with the prevailing health, and the connection between the two would be effectively and systematically traced out.

III. *Coroners' Returns*.—To the Ministry of Health would be entrusted the collection and arrangement of another set of returns, which, important as they are, are now practically lost. I mean the returns of the Coroners' courts. These documents are invaluable as signs of the moral and physical states of the people ;

for no complete estimate of the health of the nation and the causes of its prosperity or decadence can be supplied if the catalogues of deaths by violence, accident, and design, be left out of the record. Those who would correctly appreciate what is conveyed in this suggestion, should study the annual reports which the late Coroner for Central Middlesex, Dr. Lankester, so ably and, laboriously compiled from his official experience.

IV. *Medical Local Duties.*—To the Ministry of Health would be referred all the work that is now carried out by the medical department under the control of the local Government Board. The duties of attending to vaccination throughout the kingdom, of reporting the outbreaks of epidemics, and of instituting inquiries into injurious trades by which life and health are imperilled, would be under the direction of the Health department. By this same character of direction the Health minister, through the heads or chiefs of his office, would come into communication with the medical officers of health, of which body of gentlemen he would rank as the official head, and the labours of which he would direct into systematic order for the common good, without at all interfering with the local authorities for whom specially the labours are conducted. Above all, the Minister of Health would collate the leading facts connected with the work of

the various sanitary officers of the kingdom, and condense them, annually, into a form that would serve as a permanent history of the results of sanitary progress. To this end each local authority would send to him, at stated time, and always once annually, the report of its medical officer on the health of the whole district under its charge ; a report systematically arranged for ready reference, and for after-arrangement by the central department.

At this moment some hundreds, if not thousands, of the most valuable reports of different medical officers of Health are scattered about in a manner that renders them, as a whole, practically useless ; so that questions which they, if they had been systematically studied, could answer at once in the most certain manner, have to be answered and answered again and again, each time at the cost of new labour and more money. If it were for no other purpose than to bring into official and perfect organisation the labours of the Medical Officers of Health, the Ministry of Health is urgently wanted. It is due to these admirable officers themselves, not less than to the country, to have their works officially and authoritatively supervised and published.

V. *Adulteration Reports.*—The working of the Act that deals with the subject of adulteration, and that carries out public analyses, would of necessity be

brought under the direction of the Ministry of Health. The same observations that apply to the medical officers of health hold good in respect to the public analysts. The reports of these gentlemen,—reports, in many instances, of the utmost value,—are scattered far and wide, and practically are useless, except for the local purpose they were originally intended to serve. Collected and systematically condensed, these reports would indicate, at regular intervals of time, the natural progress in the production of all articles of food and drink.

Moreover, the section of the Health office to which I now refer would be most useful to the nation in other important ways. It would take under its direction analyses of all kinds that are conducted for the common good. It would supervise the analyses of waters, and would be an authority to which the parliamentary committees might at any time refer for arbitration and advice in cases of difficult evidence. It might even, with advantage, be a centre of reference in cases of poisoning, when the evidence of the analysts or experts was doubtful or conflicting. In relation to these matters the Government of the day has sometimes had to appoint a temporary authority of its own, to which it could refer for skilled research and guidance. Under the plan I venture to suggest, every Government would at all times have at hand the authority

which it can now only appoint for a special occasion, and on which the public has no natural dependence, because it may have no practical or particular knowledge of the attainments of the person or persons who have, for the moment, been appointed.

VI. *Factory Supervision.*—There is at present much confusion in the interworking of the Public Health Acts and the supervision of the factory hands under the Factory Acts. The factory medical inspectors, who know the duties of sanitary work in the great manufactories better than any other class of men, and whose functions are of longest date, are crippled in their efforts by the circumstance that their supervision is too limited. It is of such vital importance to the nation that the health of the great industrial population should be completely attended to, that, as it seems to me, all the sanitary supervision of the factory should be transferred, under proper regulations, to the factory surgeons. If this were done, the officers appointed under the new regulation would specially report to the Ministry of Health on the sanitation of the factories in the whole of the kingdom. I know of nothing that requires more serious consideration than this public question. It is at the present moment a critical question of the first order. The mortality incident to industrial pursuits is a drain on the national vital wealth which stands before emigration in impor-

tance, and is a source of silent disaffection which no one can comprehend who has not inquired into it with intelligence, and at some cost of labour. There are now nine hundred factory surgeons who know more about the vital state of the industries of England than all the legislators put together who have made up the legislative bodies of the present reign. But the work of these factory surgeons, as yet essentially local, or little more, is lost to the nation because there is no centre where the reports of it can be properly or effectively utilised.

VII. *Veterinary Supervision.*—To the Ministry of Health would be transferred what has hitherto been done by the Veterinary Department of the Privy Council. When the late Mr. Williams set that department in motion some years ago, the work was severely criticised by some of the most able men in veterinary science, and I fear it must be confessed that the work which has been carried out might have been very much elaborated and improved. At the same time it is a good idea to have an effective veterinary department connected with the State. Certainly a Ministry of Health would be most imperfect without it, and would be greatly advantaged by having it in union with itself. The health of the inferior creation of life is, in fact, so closely connected with human health, that one cannot be considered

without the other ; while the whole question of the precise connections of both remains for investigation. Apart from these philosophical considerations, there are immense commercial interests connected with the control of the epizootic diseases ; a control that cannot be perfectly exercised until, by the systematic collection of knowledge, in a central office of the State, all the data relating to the origin, course, and management of those diseases are collated and made bases of knowledge for practical service.

VIII. *Prison and Police Supervision.*—To the Ministry of Health would naturally be referred the sanitary arrangements of prisons and of the establishments of police. The inspection of the prisons under such a central direction would, now that prisons are under Government control, be easy, orderly, and effective. In one comprehensive report we should gather, each year, the most valuable sanitary facts relating to the effects of discipline, diet, labour, régime, and perfected hygienic conditions in prisons in a way which has never been realised, and in a way which, by the very contrasts it would exhibit when it was placed by the side of other social histories, would be of inestimable interest and usefulness.

IX. *Supervision of Public Works.*—Lastly, to a Ministry of Health there would, of necessity, be attached a direction having reference to the sanitary

construction of all the public works that would be carried out by the Government at its instance and expense. This function would relate to public buildings chiefly, but it would include therewith many other works, such as the laying out of roads, parks and gardens after the most healthy fashion. It would, in fact, embrace all designs and works which are under the control of the Chief Commissioner of Public Works. In the carrying out of these plans the Government would be not only the servant of the public, but its example and its teacher.

THE ORGANISATION.

From what I have sketched it will be seen that in the proposed Ministry of Health there would be several divisions of labour. I should suggest that these might be reduced to six departments in chief.

1. *The Registration Department.*—In this would be included the registration of births, deaths, and marriages. The registration of disease. The registration of coroners' returns. The registration of returns from the meteorological observatories.

2. *The Local Government Department.*—In this would be included the work now carried out by the Medical Department of the Local Government Board

with a complete system of Poor Law Sanitary Inspection.

3. *The Factory and Industrial Department.*—In this would be comprehended the sanitary supervision of factories. The regulation of age to labour. The inspection of industrial pursuits generally, in relation to the health of the industrials.

4. *The Analytical and Chemical Department.*—In this would be undertaken the superintendence of the Adulteration of Foods Act, and other proceedings of a chemical and analytical nature.

5. *The Veterinary Department.*—In this would be considered the diseases affecting the inferior animals. The condition of animals imported into the country. The cause, the course, and the prevention, of the epizootic diseases.

6. *The Prisons and Public Works Department.*—Under this department would be brought the sanitary condition of all prisons and other public buildings that are already existing. The construction, in a sanitary point of view, of new public buildings. The condition and construction, in a sanitary point of view, of the public roads, parks, and water supplies, with which the Government is specially concerned.

To each of these Departments there would be a Chief. The whole, under the presidency of the Minister of Health, would form a Council of Health,

appointed by the Government, for the Government and the People.

The Council, if it were properly selected, would have for its members,—in addition to the Minister of Health,—a Statistician, a Physician, a Factory Surgeon or Physician, a Chemist, a Veterinarian, and a Sanitary Architect and Engineer, with two other important officials to whom I shall by-and-by refer. In fact, every part of sanitary science would be fully represented ; and, if the salaries allotted to the chiefs of departments and their dependents were efficient, no country in the world would possess so perfect a sanitary organisation.

THE MINISTER OF HEALTH.

One subject remains to be considered. I mean the position and functions of the Minister of Health, who would preside over the Department.

At first sight it will occur to most minds, that, following the usual precedent, this Minister should be a Minister of State, changing, or liable to change, with every Government, and holding his office as a Chancellor of the Exchequer or other Minister of the Crown now holds his official appointment.

The impression, however, in my mind, is that such a mode of appointment would not be for the best interests of the country, nor for the best interests of

the science of preserving health. The Health Minister would differ from other Ministers of the Crown in almost every particular. He could only carry out the duties of his office after a special training for the performance of them. To leave his duties to the chiefs of departments would be to ignore them altogether, and to let the most useful parts of the office go by default, perhaps, at times when the union of the different parts of the official work in one mind, and in one direction, was most imperative.

Again, a Minister of Health ought not to be troubled with the active strife of parliamentary life. He, of all others, should not be a busy party man. He should not be an administrator at all, but a director and adviser of the Government, of whatever party it might be composed. He should always be a learner and a director of learning. It should be his function to see that all facts in his departments were duly collated, prepared for publication, and published. It might often be his duty to take personal cognizance of facts to which his attention had been specially drawn.

These functions would be incompatible with a mere passing ministerial career, and with the worry of parliamentary existence.

At the same time it would be the worst of all policies to lower the office by any omission of the

honour and character that should belong to it. Much of the success of English policy has depended on the appreciation of the dignity of an office, even beyond the appreciation of the man who fills it. It is the office that is honoured, rather than the man who holds it. The man may be indifferent, but he must die; while the office, being in perpetuity, remains the same. The rule should certainly apply to the new office to which I have directed attention; and there are numerous methods by which the end could be so accomplished, that the post of Minister of Health should be one for which the most worthily ambitious might worthily labour. It would almost of necessity make its possessor a Member of the Privy Council; and if it were found that the voice of the Minister of Health was required in one of the Legislative Assemblies, it would be as consistent to give to him a seat for life in the House of Lords as it has been to find a similar seat for the Bishops of the Church; or, to give a more recent illustration, for the two Life Peers who have been taken from the legal profession to assist the Upper House in its deliberations.

REPRESENTATION OF SCOTLAND AND IRELAND.

It will be observed that in the above outline of a design for a Ministry of Health I have not specially referred to any part of the United Kingdom. The

plan may seem at first sight to relate to England alone. I intend it to relate to the United Kingdom, and I see no reason whatever why it should not do so. In Ireland and in Scotland there are already registration departments for births, deaths, and marriages; and if to these existing offices, now so ably conducted, were added the registration of disease, the registration of the Coroners' returns for Ireland, and the returns of the public prosecutor for Scotland, together with the returns from the Meteorological observatories of both countries, the registration of the United Kingdom would be complete. The records, as a whole, could be annually embodied in the work of the central department or Ministry of Health, to which body I should suggest that the Registrars-General for Ireland and Scotland should be added as members.

It remains for me, Mr. Chadwick, to thank you, as President, and the other members of the Sanitary Institute, for the honour conferred on me in inviting me to deliver one of the public addresses at this Congress. I have spoken on a subject which, sir, I know is one of your life-long studies; a subject on which you have recently dwelt in a manner so comprehensive and clear that you have left little for anyone else to say. To that, your latest published effort, I respectfully direct the attention of all Sanitarians. My object has been less

ambitious, and at the same time less general, than yours. It has been an attempt to show that what is proposable by the sanitary scholar, if I may so express myself, is not merely proposable, but practicable. I have looked back at the course of sanitary science, as we for a long time have seen it together, in its progress, and I have tried to look upon all the difficulties that lie in the way of the realization of our hopes,—the hopes of securing some kind of national sanitary organization. From these two points of view the plan I have ventured to conceive is laid out.

It is the duty of members of societies such as ours thus to learn and suggest. It is the duty of those who, for the time, stand over us and govern us, to consider our learning and suggestion when we tender what we have to say with due respect of expression and loyalty of intent. I have spoken, I hope, in this spirit, thinking of no parties in the State, but of the State as one party, waiting for perfection of Health in all its ranks and all its boundaries. We Sanitarians 'serve and wait,' and therewith are content. We grudge no Prime Minister, no Cabinet, the endless honour and gratitude that would be earned by the device of a method that shall make the Health and thereby the Wealth of the Nation a primary and special care of the Government. We ask only that we may be permitted to see the desire of our hearts,

from which our labours have sprung, recognized ; and, that we may be the first to thank the political leader or leaders who shall embellish this present reign by the construction or introduction of a great measure for the Health of the Commonwealth.

Some nineteen hundred years ago there died in tragic splendour a great Emperor who had made an era in the history of the world. It was his chiefest triumph that, having found the city from which he ruled a city of mud, he left it a city of marble. For nearly nineteen centuries the name of that great man has been kept alive, a household word, in one sentence,—*Saluti Augustæ*,—by which has been typified, not the man alone, but his era and the work of it. To salute those who should be greeted with the best of greetings, that motto, time out of mind, has been employed. I would not for a moment reduce its ancient and well-deserved honour ; but I would, if I could, let the work of this time eclipse it, so that henceforth *Saluti Victoriæ* should be the motto of a later and greater Era and Empire.

II.

WILLIAM HARVEY.

A BIRTHDAY PROLOGUE.

VADE mecum. Let us think of a fine first of April morning, in the year of our Lord one thousand six hundred and twenty-nine, and let us in imagination go into Smithfield,—field of the noble army of martyrs,—and a field which every stranger from the country new to London would surely visit. Then, as now, we see standing across one side of the square a great house for the reception and treatment of sick people. It is the house founded by Rahere,—Bartholomew's Hospital.

As we look at this house of the sick we see passing to it from another house on the western side of Smithfield, an energetic, brisk-stepping man, past the meridian of life, who evidently has business before him of importance. He is a little man, below the middle stature, and his face, which is round, is 'olivaster in

colour, wainscot like.' His hair is raven black. His eyes are small, very black, and sparkling. His features are expressive of energy, vivacity, penetration, courage. His temperament, as we should say in these days, is nervous and bilious, the nervous preponderating. He is not really an irritable man, but quick and soon on fire. He wears a short dagger, as is the fashion of the day amongst gentlemen; and there, at the door of the hospital, where he is now speaking with some other gentleman, friend or brother worker, he gets into an argument and, as you observe, unsheathes his little dagger automatically, and, holding it in his right hand, lays the flat surface of the blade across his left hand, as if clenching an argument, or directs the point, with energy, in some new direction, as suggesting a statement, reason, or qualification. You might think this an ebullition of temper, if you did not know the man. You soon see you are deceived. That polished movement and farewell indicates a thoroughbred gentleman, with no little affectation of courtly polish, and you observe that the friend spoken to departs smiling and satisfied. The friend is clearly proud of an interview, which he will not fail to talk of to his neighbours and family, for in the interest it has excited in his mind he almost forgets to pick his way over the big stones which loosely cover the rough pavement, and has nearly gone down

on his nose. He must be careful. Everybody must be careful of tripping, physically as well as politically, in the reign of Charles the First.

At a respectful distance, we will venture to follow, into the house of the sick, him in whom we have become so much interested. He is, we detect, treated with great reverence, and we quickly discover his vocation to be that of the healer of those who are there to be healed. He has removed his King Charles hat by this time, and has thrown off his loose cloak, whereby we are able to distinguish that the short stature of the man is not thrown out of symmetry by great girth of body and limb. He has a lithe and spare body, on which body is set a head of fine proportion. The forehead is high and broad; the nose well chiselled and slightly Roman; the cheeks flattened; the lips compressed and thin; the chin curved and pointed. From the extremity of the chin and lower line of the lower jaw depends a pointed, neatly-cut beard, and from the upper lip, curving gracefully down on each side, is what we moderns know as a moustache. The raven hair on the head is combed straight back in neat and comely style.

The dress of our man is, according to the professional taste of the day, of rich black cloth. He has rather a full doublet, with sleeves cut somewhat

after the manner of a professor's gown, light plaits at the shoulders, a loose band round the elbows, and a tighter band, rather broad, at the wrist, edged beyond by a white cambric border. The doublet is buttoned all the way up the chest, but is open at the throat; and from out of it, overlapping the shoulders on each side, is a broad white collar, which sets off the fine dark face in striking contrast. The length of the doublet hides the cut of the nether garments, or breeches. The stockings are seen to be of black silk, seamed or ribbed. The boots, which reach far up the legs, stretching widely out, are fringed at the top, and are fitted neatly to the feet, high at heel and rounded at the toe. Round the waist is a loose band, from which, on the left side, the small fashionable and demonstrative dagger depends—an instrument which is never used for warlike purposes, except in a battle of science or learning, and then only in harmless and silent eloquence of gesture.

The healer, surrounded by his staff of attendants, makes his round. Patients, medical and surgical alike, come under his care, for he is a physician, and the physician is the be-all and end-all of physic in the time of the Stuarts. No great surgeons, like James Paget or Spencer Wells, have climbed in his day to the top of the tree of medical art; but such as are then called surgeons follow their leader, and,

acting merely as his handicraftsmen, do what he bids them with blind obedient skill. He is an exceptional physician, for now and again he will prefer to take the duties of the surgeons himself, and, with the true dexterity of an anatomist, will teach them some practical lesson in their craft.

We see with what respect and admiration the man we accompany is followed. The dark eyes command the admiration. Is the admiration universal? Is it possible that from every lip there is praise? It had not been a man we were looking upon if this had been his fate; and his fate it was not, for he was of man begotten and of woman born. So he was not altogether without his detractors. There crosses our path a busy, envious physician, who, disliking the admiration he observes, takes the first opportunity he gets of telling us that the man we are looking at is a good anatomist enough, but that, as a practical physician, he would not give twopence for one of the man's bills,—prescriptions,—and cannot understand his 'therapeutique way.' In the hospital itself there is some little strife, for the great physician is expected soon to go out of the country for a long season on an important mission, and is anxious to leave behind him as a substitute, one Dr. Smith, while the governors of the institution, not having 'knowledge and satisfaction of the efficiency of Mr. Smith,' are determined to

appoint Dr. Andrews to the office, whom by the way, in course of time, they do so appoint. Again, there is another person, an exceedingly knowing person, knowing and communicating, who gives us his views without telling us who he is or where he comes from ; but who tells us confidentially that the little man with the raven hair, olivaster face, piercing black eyes, and quick expression, is a 'crack-brained,' who thinks he has made a discovery that will render him immortal ; who has set Galen and all the masters right ; and who expects some other men, equally crack-brained perchance, to be writing about him hundreds of years to come. Fine joke for a man to entertain respecting himself. Crack-brained indeed, indeed !

Meanwhile, our observed of observers goes his round, caring as little what is said of him as of the gusts of wind which blow up the dry dust in the streets on that April morning. He does his duties, or, as a contemporary greater even than he,—and whom at the time he knows much less of than he will have to know,—is wont to say, 'he obeys his call,' and that is sufficient for him.

The work in the house of the sick completed for the day, wounds dressed, prescriptions written, and directions given, the cloak and hat are resumed, and once more we follow our great man to the gateway leading into Smithfield. Now at the gate stands a

handsome and handsomely caparisoned horse, with servants attending. He whom we follow springs lightly into the saddle, and with slow but steady pace, sitting his horse with much dignity, proceeds westward. Coming after him are two runners, who carry a carpet and keep in close attendance. The course taken is first into Holborn, which is crossed, down to the Fleet, and, turning to the right, straight away to St. James's Palace. Arrived there, the runners lay down the carpet at the entrance, and afterwards assist the rider, their master, to alight on it. Leaving his horse to their care, he enters the Palace as one who knows his way to its most secret and sacred recesses. The courtiers do him every honour, for his friend at Court is the chief man there. Nevertheless, even he must wait a brief period, in an ante-room, for the royal pleasure.

At last the courtier-in-waiting summons him to the presence, and royal patient and royal physician meet. Into this secrecy we must not presume to intrude. The interview is not of long duration, but it is clear that between sovereign and subject there is the most cordial understanding; for the king, none less, moves with the physician out of the audience-room, and speaks to him as to a friend in whom he is deeply interested, and to whom he offers his royal congratulations.

At the palace gate the physician remounts and proceeds back to Smithfield, calling on one or more sick persons in his journey. Arrived at home, a frugal midday meal prepares him for other and equally important duties.

His ride in the afternoon takes him in a different direction, citywards. He rides into the heart of the city, making further professional calls, and by-and-by alights at the office of a merchant, where he seems entirely at home. He passes through the place of business unchecked, and enters the private room of the owner, where he receives from two city men, each of position, a right brotherly greeting and best wishes for happy returns of the day. He calls one of these by his Christian name, Eliab, the other Daniel; and they in turn, but with marked deference, as feeling favoured by the privilege, call him William. They talk, familiarly, of family matters; and when the visitor proceeds to leave them, they accompany him to the door and stand beside him as he remounts, and converse to the last, when they bid him a truly affectionate farewell. Afterwards many merchants of character call on them that afternoon; for it has reached the city that their brother has been with the king, and a king was a king with a vengeance in those days. A royal toothache was an event then that thrilled through the city; and a word from royalty, at third hand only,

were it ever so short, was an eventful event. Brother Eliab, when he reaches his private house at Roehampton in the evening, has still his admiring listeners, and Brother Daniel, when he reaches his residence at the village of Lambeth, has the same. They have gathered that William will, in a few months, possibly, go abroad for a season, with the Duke of Lennox, and this is court news from the fountain-head.

The rider, on his part, makes his way to Amen Corner, and once more alights, this time at the famous Royal College of Physicians. Here he is again seen to be at home, and indeed he is in a position of great trust; for he holds, as treasurer, the sinews of war. He is more than this, he is professor also; and there have gathered together to meet him in the halls of the college, and to hear him discourse, many fellows and licentiates, the elects and censors, and the president. The professor puts his velvet gown on his shoulders, and following the richly-robed president, Dr. Argent, who is preceded by his mace-bearer, he enters the lecture-room, with all due solemnity, to stand once more before an admiring auditory.

In delivering his lecture, which is on some subject relating to anatomy, our honoured professor speaks with equal energy, precision, and candour. He has no severe or contemptuous words for antagonists; no

unruly passion; little appeal to mere argument; great appeal to natural fact. He is most at home in demonstration, and refers rarely to the short notes in his private desk-book. In the course of his demonstration he uses six natural diagrams of the nerves and blood-vessels of the human body. These parts have all been carefully dissected out and laid, each in natural order, on a large slab of wood, in which form they remain until the present hour. To point out the parts to which he would direct attention, the professor employs a whalebone rod about sixteen inches long, and tipped at its end with a silver point. Rod still extant.

The lecture concluded, the friendly Fellows retire to their common hall, banquet together, and offer their honoured colleague their best wishes on so auspicious a day. Their friend enjoys these simple feasts, and leaves a message, treasured by Fellows to this very hour, that such good friendship should ever be encouraged and maintained.

The banquet of these grave yet hearty men and scholars is not prolonged, and as the evening draws to its close, the physician anatomist returns to his home. But his work is not finished. He has a library of considerable value; a rare collection of curiosities; a cabinet of precious manuscripts; and arrangements in which some kind of natural experimentation can,

at spare moments like these, be followed up. We may take a final glance at him ere he retires for the night. No child breaks in on his studies, for he is childless, and his wife is so inobtrusive that she distracts him little. He busies himself, in these quiet hours, in arranging his literary work, or in experiment; and finally he takes up the work of another physician, who is to him the perfection of authors. His Virgil is his vigil, and all his soul wonders as once again he reads:—

Principio cœlum ac terras camposque liquentes,
 Lucentemque globum Lunæ, Titaniaque astra
 Spiritus intus alit; totamque infusa per artus
 Mens agitat molem, et magno se corpore miscet.

Good night, philosopher! We will leave you to go to your rest. Even your watchful eyes must sleep. Good night!

FROM BIRTH TO FAME.

The man with whom we have so far communed as closely as the living can, through history, commune with the dead, was passing, in that first day of April 1629, through his fifty-second birthday.

He was born on April 1, 1578, and the first of April of this year 1878, the day on which our revived picture of him is published, marks the tercentenary of his birth.

The name of the man was William Harvey. The grand lifework of the man was the complete discovery of the circulation of the blood.

At the time we have been led to make his acquaintance, Harvey was in the throes of immortality. Hardly a year ago he had published a work in which he had claimed to have demonstrated the motion of the heart and blood through the body. The work had had time to extend and become known, and throughout the world of learning, at home and abroad, it had spread the fame of its learned author. The time had not yet come for cavil, for the work had hardly been comprehended in detail. It stood for astonishment, in anticipation of criticism. Sufficient of it had, nevertheless, been seen to insure for its writer that he could never be forgotten. He had carved the name of William Harvey into all languages that were written, and had sent it forth into all days that were to come. In what degree of dignity, honour, and praise he had sent it forth might then be doubtful, but for good or for bad it had been stamped in the mint of the learned, and had been issued as accepted coin. We shall have to ask by-and-by what the value of the coin was. Previous to this it were well to look at the man from his youth, and see how and why he stepped into the place he had

won at fifty-one years of age. Our narrative on this point shall be as brief as true brevity can permit.

The lady who gave birth to William Harvey was, in her maiden state, one Joan Halke. His father, Thomas Harvey, was a Kentish yeoman. His native village was Folkestone, in Kent. He was the first-born of his parents. He ran about for ten years, and then went to the grammar school at Canterbury, where he remained till he was made fit for Cambridge, and in May 1593 he was entered as a student at Caius College, with physic before him as his profession. What he learnt at Cambridge besides the classics is not known, but in 1597 he obtained his degree of Bachelor of Arts, and left the university. He now went to Padua, the more efficiently to learn the science and art of physic, and he remained at his studies at this famous school five years, occasionally visiting Venice. At Padua he was the pupil of the anatomist, Fabricius of Aquapendente, a most approved master. Five years were here passed. He took at Padua his degree of Doctor in Medicine and Surgery. Thus entitled, he returned to his native land, took up also his M.D. at Cambridge, and, entering London, settled down to practice. In 1604 he was admitted to the Royal College of Physicians, and in 1607 he was elected a Fellow of that College.

It is clear that, in starting out in his professional career, Harvey had fewer difficulties to meet than most men who have become eminent in science. A man who could afford to spend five years as a student in Padua, who could take up his honours, without any other trouble than the mere preparation for the ordeal of examination, must surely have had means of an ample kind. His parents, indeed, seem to have been persons of competency; and five of his brothers, Thomas, Daniel, Eliab, Michael, and Matthew, being merchants, carrying on trade with Turkey and the Levant, we have fair evidence that he entered professional life with little anxiety as to his future in a pecuniary point of view. We may presume, further, that he had early in his career much personal influence, and that he took position and practice more speedily than falls to the lot of most Esculapians.

Some time, and not many years, after his entrance into London, Harvey married the daughter of Dr. Lancelot Browne. This, again, shows prosperity and favour on his side, since Dr. Browne was a man of consequence in his day. In 1609 he applied for the office of physician to St. Bartholomew's Hospital, then held by Dr. Wilkinson. In this contest he had the assistance of letters of recommendation from the king, James I., and, as his request was granted, he was temporarily elected to do work for Dr. Wilkinson. Wilkinson

died the same year, and Harvey was promoted in his stead.

From letters relating to this election, it seems that John Harvey, a younger brother of William, was one of the king's footmen,—an office of honour in those times. This fact may account for the royal influence exerted in behalf of William in his Bartholomew's Hospital election, and for his introduction to court, subsequently, as a Court Physician.

In 1615, Harvey was chosen to deliver the lectures on Anatomy and Surgery at the Royal College of Physicians. These lectures had been founded by Dr. Richard Caldwell. Caldwell, a Staffordshire man, was born in the year 1513, and died in 1585. He was a graduate of Oxford, and in 1570 was made President of the London College of Physicians. His contributions to medical literature were few. One translation of his, of little importance, remains. It is Horatio More's 'Tables of Surgery.' His reputation consists in his having founded the chair above named.

It is presumed that Harvey commenced his demonstrations of the circulation of the blood in the first course of lectures ever delivered by him at the Royal College, viz., in April 1615. This may be so. The statement, however, is an historical hypothesis. It is at the same time certain that, in succeeding

courses, he took pains to illustrate his labours on this subject more and more fully ; for in his preface to the work on the motions of the heart and blood, he speaks of having demonstrated the views it contains for nine years, in his anatomical lectures at the College, and he appeals to the accomplished president and other members as witnesses of the truth of his explanations.

By the year 1623 Harvey had so far risen in reputation that he was chosen Physician Extraordinary to King James. Surely no other English king ever had so extraordinary a physician. When James died, Harvey continued to hold the same office to Charles, from whom, as Dr. Willis observes, he received many favours and much assistance, I may say, sympathy. As well as to the king, he was medical adviser to Lord Bacon, and others of the illustrious of the time ; but as he was too scientific for the vulgar, and a simple truth speaker, he gained the honours of science, while he lost the character of practical physician. Had he lived now, it were the same.

It was not until the year 1628 that the great work on the motion of the heart and blood appeared. Its author had by this time matured his views ; he was master of the subject, and in what he had to say he could feel that every sentence was a demonstration. Perhaps nothing could have indicated the clearness of

his judgment better than the pains he took not to rush into print until his designs were completed, and his own mind could take in some of the fulness of his own discoveries.

When the book at last came to light, it was a demonstration so pure, so clear, so positive, that even now the man who shall have learnt the facts of the circulation of the blood from his boyhood shall find an inability to describe them with equal precision and power. There is not a faltering step at any point. The argument is a pure specimen of practical inductive reasoning; and Dr. Willis wisely observes that "had Lord Bacon written his 'Novum Organum' from Harvey's work as a text, he could scarcely have expressed himself otherwise than he has done, or given other rules for philosophising than those which he has laid down in his celebrated treatise."

THE HARVEIAN DISCOVERY.

That which was discovered by Harvey has been known since his time as the plan of the double circulation of the blood through the human body: the circulation of the blood through the lungs from the right to the left side of the heart, or the lesser circulation; and the circulation of the blood from the left side of the heart over the body back to the right side of the heart, or

the greater circulation. The courses of the circulation in these two directions he made so clear, that none but those who would not see could fail to discern. Beyond this he completely expounded the mechanism of the heart, showed the independence of the right and left sides, and indicated the true motions of the heart by which the blood is received, directed, and propelled. Much that was purely anatomical had been discovered before the time of Harvey in respect to the circulatory apparatus. Hippocrates had declared that the heart is a muscular organ. Herophilus, who lived in the time of the first Ptolemy, had distinguished that the pulmonary veins partake of the character of the arteries, and had given them the title of arterial veins. Galen had assumed that the blood is moved from the heart, but he taught that the two sides of the heart are not truly separated, and that the blood held in the two sides is admixed through or within the muscular septum between the ventricles, and that from the ventricles the blood ascends to meet in the extreme parts, and returns back to the heart by the same channels, to meet once more and admix in the heart.

These ideas respecting the circulation of the blood, false as they were in some respects, were not without their uses. They suggested movement of blood to and from the heart, and they defined the order of

vessels, veins and arteries, with a connecting centre to them, the central heart.

There was another anatomist, moreover, who a short time before the birth of Harvey had most of all distinctly cleared the way for him and his discoveries. I refer to Vesalius, the father of modern anatomy. I have recently been studying afresh the labours of this most remarkable man, and the wonder to my mind is that he should have missed the discovery of the circulation. He disposed of the Galenic view of the porous character of the septum of the ventricles. His delineation of the valvular mechanism of the heart,—of the larger valves between the auricles and the ventricles, and of the smaller or semilunar valves at the roots of the greater vessels, of which I subjoin faithful copies from his own original work,—shows how well he understood the valvular mechanism of the heart.

His delineation of the blood-vessels passing from the right side of the heart over the lungs, of which the third drawing is a correct representation, proves how carefully he had traced out the course of the pulmonary vessels into the lungs.

His delineation of the blood-vessels passing from the lungs into the left side of the heart, carefully presented in the fourth drawing of page 51, indicates

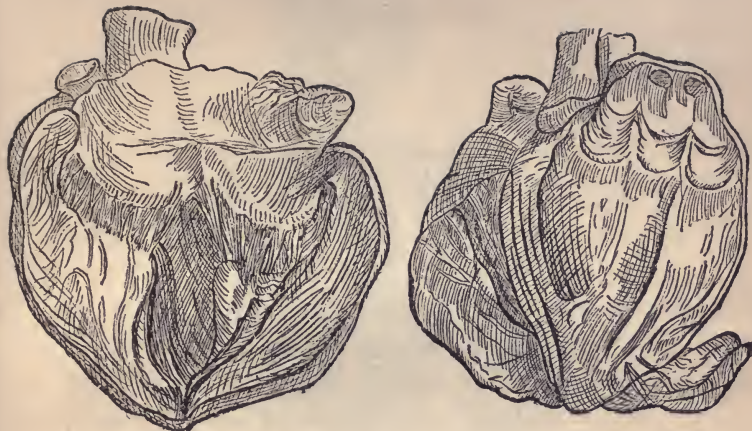
how definitely he had traced the course of the blood-channels back from the lungs into the heart.

Lastly, his delineation of the arteries or out-going vessels of the body from the heart, and of the accompanying and returning veins, a true copy of which delineation is supplied on page 53, amply declare how completely Vesalius had unravelled the anatomical network of the circulatory canals, and had followed out their courses from and to their centre.

After Vesalius came Harvey's own anatomical master, Fabricius of Aquapendente, who discovered the existence of valves in the veins, and showed that those valves were intended to prevent the blood falling back, as it is making its way from the extremities towards the heart.

It ought to be admitted, with perfect candour, that to these anatomists Harvey was indebted for his basic knowledge of the circulation. He might have been indebted to some others ; but to introduce their names at this point would be to anticipate the question of the originality of his discovery, for the consideration of which I reserve a special part.

In these days of learning, it is very easy indeed to understand the circulation of the blood. Every well-informed schoolboy, on looking at the blue veins in his body, knows that they and all veins carry blood to the right side of his heart. He can tell easily enough

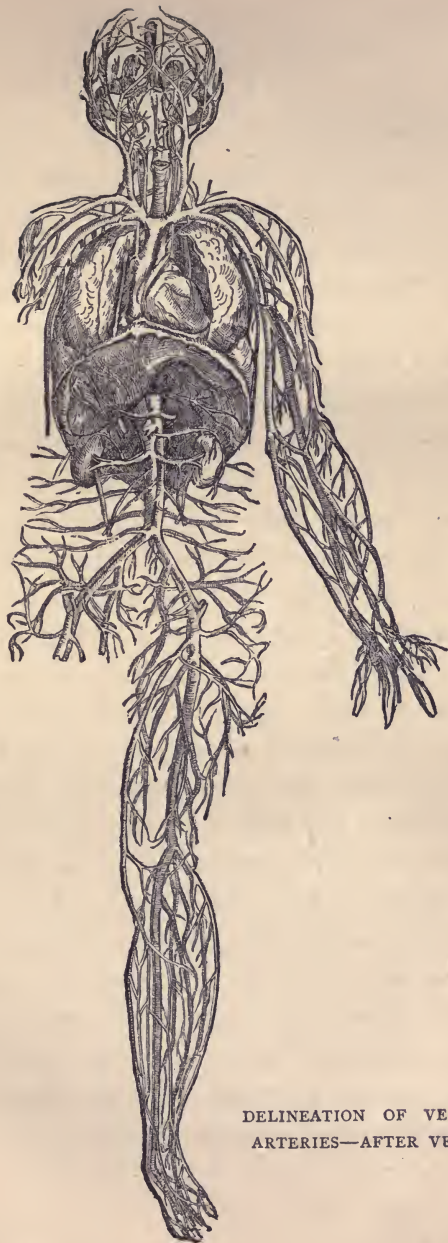


DELINEATION OF THE VALVULAR MECHANISM OF THE HEART—
AFTER VESALIUS.



DELINEATION OF VESSELS FROM THE RIGHT SIDE OF THE HEART
TO THE LUNGS, AND FROM THE LUNGS TO THE LEFT SIDE OF
THE HEART—AFTER VESALIUS.





DELINEATION OF VEINS AND
ARTERIES—AFTER VESALIUS.



that the blood reaching the heart by the veins enters into the little ear-shaped cavity of the heart, called the right auricle. He can explain that this auricle, contracting when it is full, drives the blood into the right ventricle, and that the blood cannot get back into the auricle because three curtains, acting as valves, and opening into the ventricle, bar the way backward. He can define that the right ventricle, when it is filled with blood, contracts, and that, being prevented from driving the blood into the auricle, it drives it through a large blood-vessel, the pulmonary artery, into the lungs. He can describe how, at the mouth of this blood-vessel, three little half-moon-shaped valves let the current of blood pass on to the lungs, but prevent, by their closure downwards, any return into the ventricle. He can follow the course of the blood over the lungs, trace it from them, by the four returning pulmonary veins, into the little left auricle of the heart. He can show that this auricle, when it contracts on its contents, drives its charge into the strong left ventricle beneath it. He can describe how the filled ventricle, contracting on its blood, is prevented from driving it again into the auricle, owing to the interposition of two large curtain valves, which open into the ventricle and close the cavity from the auricle above, during the ventricular contraction. He can describe that the blood, under the

force of the ventricular contraction, impels its charge into a great out-going artery called the aorta, at the mouth of which artery are placed three other half-moon-shaped valves to prevent return of blood into the ventricle. Lastly, from the aorta he can trace the blood over the whole body, pulse by pulse, with every stroke of the heart, until it returns again in steady current by the veins to the centre from which it started in its course, and which is ready to receive it and propel it on in successive circulation.

So simple is all this now, that a schoolboy may describe it. It is so easy, that at this day it becomes very difficult even to shadow forth all the obstacles which stood in the way of the Harveian discovery of the problem of the circulation. And yet the obstacles were enormous. The doctrine of vital spirits, wrapt up in all the mysterious rags of mythology, had to be torn down. Mechanical arrangements, simplest of the simple, required an explanation, to meet and supplant the subtle dogmas of tides and fluxes. A number of holes which did not exist between the sides of the heart had, notwithstanding Vesalius, still to be sealed up by man as well as by nature. The pulse-beat had to be disconnected from the breathing as its cause, and assigned to the heart. The so-called systole, or driving-forth stroke of the heart, had to be turned into the diastole or filling of the heart, and the

so-called diastole into the systole. The *chordæ tendinæ*, or fine threads, which hold down the larger valves, had to be proved to be mechanical cords, not nerves. The simultaneous action of the two auricles and of the two ventricles of the heart had to be made clear; the four motions distinct in point of place, the two motions distinct in point of time. And, again, the existence of a circuit of blood, from the left heart into the arteries, from the arteries into the veins, from the veins into the right heart, from the right heart into the lungs, from the lungs into the left heart, and so on and on continually, had to be fully explained, to be seen first and afterwards demonstrated. To grasp the completeness of the Harveian exposition, in short, it must be read in its entirety; read as a method, not less keenly than as a description. The beauty of it is, that it is all proved, as far as a man in his day could prove the fact. He did not see dead quiescent anatomy only, but living moving anatomy. The two auricles at the inverted base of the heart were not to him mere receptacles in open communication with the veins from the body and with the veins from the lungs: they were contracting receptacles filling with blood and sending the blood into the ventricles, filling simultaneously, contracting simultaneously, and, while contracting, pushing their fluid contents into the relaxing ventricles beneath them.

Again, those two larger cavities of the heart, the ventricles, with the thick septum between them, were not to him mere pouches communicating with the auricles and receiving their blood. They were filling and contracting parts also ; they filled as the auricles emptied ; they filled simultaneously and contracted simultaneously ; and they filled the two circulations,—the lesser or pulmonic, the greater or systemic,—simultaneously.

There are valves opening downwards from the mouths of the auricles into the ventricles on each side, and there are valves opening upwards from the mouths of the great vessels, and the functions of these valves, as described above, had to be demonstrated.

This demonstration was the work of William Harvey.

THE HARVEIAN CLAIM.

When the clamour with which the work of Harvey was received had died away in great measure, his position was somewhat as follows.—There was a general steady belief that he had made a great discovery. There was a limited but sturdy belief that he had not. There was a rumour that the man was a little touched in the upper storey. There was a confidence that he was a theorist, and that the lives of the lieges were not safe in his professional hands. His practice therefore dwindled.

It is a grand feature in the character of Harvey, that he met his objectors with the decision and calmness of a silent spectator. His converse was with Nature, not men. He construed to men what Nature opened to him, for their benefit, not for his own glorification. So long as this communion with his divine mistress was perfect, what to him was the prating of the ignorant? He let them have their say, therefore, knowing them wrong, and replied but to Riolan, and one or two others whose obstinacy was most wonderful. He replied to these even, not from himself, but from Nature. He did not say 'I believe,' but 'I know.' He did not whine out, 'Listen to this argument,' but said in a word, 'Look at these facts, and if you choose to deny the demonstrable, I have nothing further to say to you.'

When the natural law revealed by him was established beyond controversy, a new phase occurred. The charge of plagiarism was thrown in his teeth. He made no reply. No! not a word. He could trust to history for vindication, and wait. His rest in this respect has been long, for the imputation has never yet been fairly committed to solemn burial.

In defending Harvey from the charge of plagiarism, or in accusing him of plagiarism, a little knowledge of history and of the meaning of discovery is required. They who think that Harvey took up, in his labours

on the circulation, a subject *de novo*, and worked it out to its ultimate position, err, in that they argue on an impossibility; for there never yet was such a discoverer, and never can be. They who maintain that a man who projects a great principle is not a discoverer, because the elements of the discovery are in his hands, err also, because no man can work out a principle without details.

But let us be patient, and hear two or three of the most striking charges against the claims of Harvey to originality in the discovery of the circulation. The first charge brought against him originated in his lifetime. Its hero was Father Paul, Sarpi of Venice, a Servite, and the historian of the Council of Trent. Father Paul was one of the bravest of the liberal thinkers of his time but cautious withal, and, to outward form, obedient to the Church. To him is attributed by his admirer, Fra Fulgenzio, and some other friends, the discovery of the valves in the veins and of the circulation. There is not a shadow of proof that Father Paul knew anything of anatomy. Still, so it is said, he made this discovery. He was not able to make known his research, because he lived next door to the Inquisition, and because certain of his colleagues already suspected that if they could only get off the good man's hose, they would find the first stage of the cloven foot

beneath. Thus frightfully placed, and open to the gravest suspicions, Father Paul was mum—just sufficiently mum to save his orthodoxy and lose his honours. For, alack-a-day!—when the good man's scientific heart was overflowing with his immortal find, he communicated it, in the dead silence of private friendship, to the anatomist Fabricius. Fabricius himself, desiring no inquisitorial change of climate, kept the secret long, hard, and fast. At length a pertinacious young Englishman, named Harvey, visited Padua, and ingratiated himself so far into the good graces of Fabricius, that to him the fact was revealed, Father Paul himself taking part in the disclosure. The Englishman opened his eyes; read, marked, learned, and inwardly digested; returned quickly to free England; and, awarding to Fabricius the discovery of valves in the veins, claimed to himself the greater problem of the circulation, and generously saved the Father from the wheel by ignoring him altogether.

This is the Father Paul story, the true reading of which is, that a copy of Harvey's book, after its publication, fell into Father Paul's hands; that the father, interested in it, made notes from it of the discovery; that the notes were found among his writings after his death; and that those copies were cleverly transformed into the history of an original discovery.

Another priestly author, who has been described as the discoverer of the circulation and the anticipator of Harvey, is Nemesius, who became converted to Christianity about the close of the fourth century. Nemesius, after his conversion, was made Bishop of Emissa, and wrote a book on the nature of man, which was republished at Oxford in English dress in the year 1671. This book is remarkable for its metaphysics rather than its physics ; but there are passages in it which have been supposed to contain the facts of the circulation. The only passages which can possibly give rise to such an opinion are :—1st, a sentence in which the author says that the pulse-beat originates in the left ventricle of the heart, this being dilated and contracted regularly :—2nd, that during the dilatation the ventricle draws the thin blood from the next veins, which blood forms the food of the vital spirits :—3rd, that during the contraction the ventricle throws out whatever vapours it has through the whole body, which vapours are expelled by the mouth and nose in expiration. We need not hesitate to throw over this assumed discovery. There is in it no trace of a circulation.

That immortal heretic of the sixteenth century, Michael Servetus, is another writer to whom the discovery of the circulation has been accredited. Without quoting in full the passage which has been

copied and recopied till it has become hackneyed, I am free to confess that Servetus knew the pulmonic circulation, and I cannot quite agree with the learned Willis in his mode of discussing Servetus. Dr. Willis, the translator of the works of Harvey, argues that Servetus suggested the course of the blood through the lungs as a mere hypothetical proposal for getting over the difficulty of the solid or nearly solid septum of the ventricles. I think Servetus saw the transmission clearly enough, and argued it out, not on the point of the impossibility of a solid mid-wall, but on the fact of the relative size of the vessels of the right and left sides of the heart. Nay, he had knowledge of a change in the colour of the blood in the lungs, as a result of the admixture of air and blood in those organs. It is therefore true that Servetus knew the pulmonic course of the blood from the right to the left side of the heart. But as we find him ignorant of the continuous current in this course, and of a current from arteries to veins, as well as of all true knowledge of the heart as a propelling organ, we must season our admiration of him with the conviction that the circulation of the blood would never have been understood from his delineation.

Another assumed discoverer of the circulation has been brought forward in these days by Mr. Joseph Sampson Gamgee. The discoverer in this case is

Carlo Ruini, a veterinary surgeon, whose work on the Anatomy of the Horse was published in 1599. That this claim may be fully understood, I subjoin a literal translation of Ruini's description, on which Mr. Gamgee founds his advocacy. The passage is from the Venetian edition of Ruini's work (1599), vol. i. lib. ii. pp. 108-110:

“The office of these ventricles is: of the right one, to dispose the blood, so that of it may be generated the spirits of life, and the lungs be nourished; of the left, to receive the blood so disposed, and convert a part of it into the spirits which give life, and send the remainder, together with those spirits, through the arteries, to all parts of the body. In one and in the other ventricle are two mouths or openings; through those of the right enters the blood of the great vein or cava, and goes out by the arterial vein; and through those of the left ventricle the blood enters accompanied by the air prepared in the lungs through the venal artery, which blood, all made spirituous and most perfect in the left ventricle, goes (guided by the great artery) to all parts of the body, the lungs excepted, to impart to them heat, which gives life. Every one of these holes of the heart has at its mouth three little curtains, called *hostidi* by the Greeks; some of them are turned inwards, others outwards. At the mouth of the first hole which is seen in the

right ventricle, to which is conjoined the great vein or cava, is a curtain or thin membrane, which completely surrounds the hole, and, advancing somewhat towards the concavity of the ventricle, divides into three curtains, each of which finish, as in a point of a triangle, a little above the middle of the ventricle, and from each of these points arise some nervous threads which are inserted into the sides of the ventricle towards its end. These curtains were there placed by nature in order that, in opening when the heart widens, they might allow the blood to enter from the great vein into the right ventricle, and that when the heart retracts they might, by shutting the first hole, prevent the same blood there entered through the great vein from re-entering it, instead of going out through the arterial vein. The curtain which is at the second hole of the same right ventricle to which the arterial vein is attached is not made of a simple curtain, but is divided into three very distinct ones, each of which commences in form of half a circle from the trunk of the arterial vein, growing considerably thicker from its commencement, and widening out from the heart, and as it becomes thicker it forms some tubercles, which are impressed in the highest part of the heart; from these tubercles arise three curtains, each of which is in the shape of a half-moon, without being attached to the heart or to

any other part. As these three curtains open, they let the blood pass out through the arterial vein to the lungs, and when the heart widens prevent the blood returning into the right ventricle, through the mouth of the open arterial vein. Almost in the same manner as in the first hole of the right ventricle, another curtain is placed at the commencement of the first hole of the left ventricle, from which arises the venal artery which is distributed to the lungs, but does not divide into three but only into two parts, which are very wide above, and end in a solid point which descends considerably lower down than the points of the curtains of the right ventricle, and are larger and stronger than these; and one of them occupies the left side, the other the right of this ventricle. Their office is, on opening when the heart widens, to allow the blood and the spirits to enter the left ventricle from the venal artery, and when the heart retracts to prevent the blood and spirit again returning into the venal artery. To the three curtains of the second hole of the right ventricle correspond the three which are placed at the mouth of the second hole of the left ventricle, to which the great artery is attached; the curtains of the two sides are altogether similar, except that the left ones are much larger and stronger, as the great artery is also larger than the arterial vein. When the heart retracts, these curtains open and allow

the vital spirit to pass out with the blood, which goes with impetus into the great artery; and when the heart widens, they, by shutting the hole, prevent the spirit and the blood re-entering the ventricle."

Such is the description of Carlo Ruini, and a wonderful description it is. The merits of Ruini are:—1. That he had a consummate knowledge of the anatomy of the heart. 2. That he had a shrewd notion, derived evidently from a study of the mechanism of the heart, of the course of the current of blood through the heart. No more. If Servetus may be said to have known the pulmonic circuit, Ruini may be said to have known the pulmonic and the cardiac circuits. Here he stopped. Of the grand scheme of the two circulations, with the heart as their centre, their connecting organ, and their common forcing machine, and of the blood-stream always going on, of the endless blood-chain,—of these things,—Ruini knew no more than his fellows, nor would the circulation ever have been comprehended if the physiology of the heart and blood had remained where he left it.

In a sentence, Ruini gave a true description of the circulation, with this distinctive character, that his circulation is altogether a dead thing, calling for animation to make it a perfected discovery.

Ruini dealt with, there remain three other claimants who have a right to some notice. These are:

Fabricius, the master of Harvey ; Realdus Columbus; and Cæsalpinus of Arezzo.

Fabricius has the credit of discovering the uses of the valves in the veins, and to him Harvey accords the fullest credit. Of his claim as the discoverer of the whole problem of the circulation, nothing affirmative can be declared from anything he has left behind him in way of proof.

Realdus Columbus deserves more credit. He knew that the blood from the body passes by the two great veins, the inferior and superior *venæ cavæ*, into the right auricle, thence into the right ventricle, thence into the lungs: from the lungs into the left auricle, from the left auricle into the left ventricle, and from the left ventricle, by the great aorta, over the body. He also argued—and the argument was of use to Harvey—that the large quantity of blood which is carried to the lungs by the pulmonary artery could never be intended for the mere nourishment of two such small organs as the lungs. Columbus made an advance by which he got very near to the truth ; but he did not discover the circulation of the blood. He had no true conception of the heart as the propelling organ ; he had no idea of the steady circuitous current, unbroken and ever in motion. All honour nevertheless to him, for his labours assisted Harvey.

The last man of the three above named, Cæsalpinus of Arezzo, is the one whom the modern Italians have most delighted to honour as the true discoverer of the circulation of the blood. They have recently erected a monument to his memory, and on it have stamped a merit which they would fain deny to the English Harvey. For my part, I am second to no Italian in my deep and earnest admiration of the great school of anatomy which Italy produced in the sixteenth and seventeen centuries. But justice enforces that this claim for Cæsalpinus shall not be permitted. He is indeed behind Columbus, and far behind Ruini in the race of discovery.

Concerning the anatomy of the circulation Cæsalpinus knew the same as Ruini, the same as Columbus. To this he added the further knowledge, that if a vein be compressed it fills and swells at the part below the ligature; that is to say, at the part the other side of the ligature from the heart. But whether so much value is to be attached to the knowledge of that fact as is declared for it, may well be doubted. It was a fact that had been known ever since the practice of abstracting blood from a vein had been carried out—a fact which every barber surgeon demonstrated whenever he put on the fillet to fill the vein that had to be punctured by the lancet. It may certainly be allowed to pass without attributing

to it anything that carries the claim of discovery of the circulation of the blood.

The staunch advocates of the claims of Cæsalpinus would not, probably, say much about this matter of the filling of a vein. They have a much stronger point of defence, in that their man made use of the magic word 'circulation.' It is true he did use that word, and he also used another word after Servetus, viz., 'anastomosis,' or the opening of blood-vessels the one into the other; by the use of which terms he might at first sight seem to have solved the whole problem.

That Cæsalpinus missed the discovery altogether is clear as the sun at noon, from his own works. He actually disputes the statement of Hippocrates, that the heart is a muscle. He clings to the old notion that the septum of the ventricles is porous. He ascribes the cause of the swelling of the filleted or ligatured vein to an effort on the part of the blood to get back to its centre, lest it should be cut off and suffocated. He makes the motion of the blood like the Euripus, a wave-like motion, to and fro, as the ancients described it. To these errors many more could be added. They are amply sufficient to show that Cæsalpinus had no conception of the motion of the heart and blood, as that motion was recognised after the Harveian announcement.

And now, although the learned Willis names

sixteen other claimants, from Plato up to Harvey, I think I have touched on all claimants who are worthy of notice. No! there is one more. Our own Shakespeare has been adduced as a discoverer of the circulation. A speech of Brutus to Portia, the speech of Warwick over the dead body of Gloucester, beginning:—

Oft have I seen a timely parted ghost ;

and one or two other passages, have led the Shakespearian idolaters to put forward their idol. They might as well award him the discovery of the stethoscope, because he makes Hamlet say:—

My pulse as yours doth temperately keep time,
And makes as healthful music.

I need not linger on this argument. It is no discredit to Shakespeare to say he was not an anatomist ; no dishonour to him to say he was not omniscient ; no falseness to him to declare he did not even assist in the discovery of the circulation. What he knew on the subject belonged to that mystical pre-scientific learning to which he was so wedded. What he says is more like a reflex of the saying of Nemesius of Emissa, than of any other writer : some prose passage of that sort put into his exquisite verse to suit one of his passing ideals, and having no nearer relation to the discovery of the circulation of the blood than the beautiful mirage has to the city for which it is mistaken.

Does the reader ask what, beyond all these men and others whom I have not named, William Harvey accomplished? I answer him, Everything. His work was not on the anatomical courses of the blood alone; it was not on the circulation alone; it was on the motion of the heart and blood; and in the application of that expression lies the greatness of his discovery. Motion means life, and Harvey saw the living motion. His predecessors had been anatomists. He was not their inferior on that head, and he was what they were not, a physiologist as well as an anatomist. He first saw the motions of the different parts of the heart and defined them. He first defined the arterial pulsations, making them a part of ventricular action. He completed the argument as to the uses of the valves of the circulatory apparatus everywhere, and showed from them, as if to his mind they were so many directing side-posts, the one course, and none other, the blood must take in the circulatory channels. He replaced the ideal of a wave-like motion of the blood by the demonstration of a regular current, pulsating in the arteries, steady in the veins. He showed that compression of a vein empties it on the heart side of the compressed part, and fills it below, without return of the blood into the arteries; and he proved that compression of an artery empties its corresponding veins throughout their whole course, so that the current of blood is always in one direction.

Under the influence of his genius, I repeat, the hitherto death-like circulation became a flowing river of life, so plainly depicted that no hand now could take up pen and describe it better or more completely than his hand described it.

And this is the soul of genius, the perfection of originality: to start from the knowledge of many smaller men, or of men less fortunate; to master their details; to bring their details into form out of void; to go to Nature for corroboration or contradiction of details; and, from the whole study, to divinely recreate the created, and thereby show to everyone, gentle and simple, what he has never seen before, but is obliged to see clearly when the light of truth illumines the way.

FROM FAME TO DEATH.

For twenty-seven years after Harvey had attained his wide and certain fame, he lived in this world, undergoing many vicissitudes. He visited the Continent in 1630 with the Duke of Lennox, returning to England in 1631-2. In 1636 he revisited the Continent, this time as one of the embassy of the Earl of Arundel. Reaching England once more about Christmas 1636, after an absence of nine months, Harvey resumed his practice, but was much occupied in attendance on the king, whose physician he was. He attended the ill-fated Charles on his

expeditions to Scotland before the outbreak of the revolution, was with him at the outbreak, and while, on the memorable 23rd of October, the blundering Rupert was sacrificing the success of the battle of Edgehill, near to Kineton in Warwickshire, Harvey was resting under a fence in charge of the young princes, the sons of the king. With the king he went to Oxford, and remained there some years, replacing, by his Majesty's order, Nathaniel Brent, as Warden of Merton College, and losing, meanwhile, by the plundering of his town house, his goods and chattels, and, worse than all, many of his anatomical papers—a loss never made up, and never forgotten.

In 1646, when Oxford gave way to the Parliament, Harvey returned to the metropolis, houseless and widowed by this time. Two of his merchant brothers therefore received him at their homes alternately. Sometimes he resided in the city, but his favourite haunt seems to have been at the house of his brother at Combe, where he studied in the 'caves' some newer secrets of Nature, which secrets, on the solicitation of his friend Dr. Ent, he gave forth in his great work on generation. At the age of seventy-one, he once more visited Italy, and with that journey ended his peregrinations out of England. The last years of Harvey were still devoted to study, to his lectures at the Royal College of Physicians, and to the develop-

ment of that college, to which he added a museum, opened by himself on February 2nd, 1653-4, a library, and all his natural curiosities, for, alas! the great fire of London to consume.

It was not until 1656, the seventy-eighth year of his age, that William Harvey relinquished his professor's gown. He was breaking up by this time, a martyr to gout, and wearied with the many cares of a chequered, anxious, and laborious life. On June 3rd, 1657, he was seized with palsy of the tongue, and knew his end was near. His nephews being sent for, he gave to one his watch, to another his signet ring. He signed to Sambroke, his apothecary, to let him blood in the tongue, but to no avail, and 'with easy passport,' as the evening drew nigh, his evening closed. The sun and William Harvey went down together from the sight of men; but both immortal.

A few miles from the quaint little market town of Saffron Walden, in Essex, lies a small village called Hempstead. Eliab Harvey had built a family vault there, and thither, followed for many miles from the city by the fellows of the Royal College, the body of the great anatomist was borne to be laid at rest. In the open vault he was placed 'lapt in lead'—not buried, in the ordinary sense of the term; and there, 'lapt in lead,' what remains of his body still lies.

THE REMAINS OF HARVEY.

Thrice in the past thirty years, I have visited the vault at Hempstead, and viewed the leaden receptacle that holds, like an Egyptian case, the remains of Harvey. In 1847 the case was lying with others,—there are over forty of them,—near one of the open gratings of the vault. There were many loose stones upon it, and a large crack in the lead. In 1859 Drs. Quain and Stewart, who went to the vault by request of the Fellows of the Royal College of Physicians, found the remains in even a worse state, for the leaden case was then almost full of dirty water. In 1868 I found the case in its previous position, but clean and dry. The vault, which had been repaired, was also now clean and dry. In the case there was still an opening, but the water had either been removed or had escaped by evaporation. I was able to throw a reflected light into this opening, but I could see no remains, and I think that there is little left of what was once the bodily form of our greatest English anatomist.

On the 19th of July of this present year 1878, I have once more visited the vault where the remains lie still encased in lead, and have made more detailed observations of the Harvey chapel in the church at Hempstead, and of a bust of Harvey which is also

erected there. It occurred to me, in 1868, when looking at this bust, that the face of it had been copied from a cast taken from the face of the anatomist himself after death; but as I was not sufficiently conversant with the sculptor's art to come to a decision on the point, I this time invited my friend Thomas Woolner, R.A., than whom none could know more on such a subject, to accompany me. The result of Mr. Woolner's careful examination of the bust is to confirm the view stated above, that it is a direct copy from the cast of the face of Harvey in death.

The leaden shell in which the remains are enclosed is much decayed now. The lead of the upper surface is so collapsed that its inner face almost touches the inner face of the bottom of the shell. The opening is still there, and the space within, as far as can be ascertained, contains a large quantity of thick dirty water or mud. This further observation leads me to fear still more that there can be little left of the body that was entombed in the shell.

It would be well if what there may be left were safely deposited in the Mausoleum of the Illustrious, the Abbey of Westminster. John Hunter and David Livingstone would be nobly companioned by William Harvey.

III.

A HOMILY, CLERICO-MEDICAL.

THOMAS LINEACRE, founder of the first scientific society in England—the Royal College of Physicians—Physician, Rector of Wigan, and Precentor of the Cathedral of York, being on the point of death, sent for his advisers, and bequeathed the means to establish in each of the Universities of Oxford and Cambridge a professorship for the following objects:—1. The glory of God ; 2. The true art of medicine ; 3. The help of the fallen ; 4. The increase of this realm. His death, which occurred a few days later, separated for the future, in this country, the two vocations of divinity and medicine, as vocations connected with the living labours of one and the same man. Yet the will of Lineacre shows that to the last he could see the natural connection that exists between the vocations. To his mind, after the glory of God comes next in order the true art of medicine, and from both the help of the fallen and the increase of the realm.

It has often been a subject of regret that the absolute division of the two professions was ever formally made, and I confess I have never been able to detect, though I have exercised some diligence in the inquiry, why it was so suddenly and completely effected as we find it to have been after the decease of Lineacre. Whether anything has been gained by the separation, I will not venture to say. Neither dare I venture to suggest that by the severance of the union the clerical profession has lost anything whatever. But it is certainly becoming, and truthful as it is becoming, for me as a medical scholar to say, that medicine would more than once have gained largely had there been no such severance. Several notable instances of men connected with the Church of England, as ministers of that Church, illustrate the correctness of this view. The writings and works of Bishop Watson indicate what a great mind would have been introduced into scientific medicine, had he been at liberty to cultivate the art of healing the body. The physiological essays of the Rev. William Jones, once Rector of Paston, in Northamptonshire, breathe the purest scientific spirit, and show how keenly he would have cultivated the medical side of learning, if he had pursued that bent of his inclination. The original observations of the Rev. Stephen Hales, once Vicar of Teddington, were most remarkable in their

bearings on the science and art of medicine. By his scientific work Hales not only added some of the most important facts to physiology, but he ranks as the actual originator of the system of ventilating ships, houses, and other public buildings. He was the first to measure the deterioration of common air by the process of respiration, and he led the way to those sanitary reforms which have cleansed our gaols of plague, and purified our houses from the poisonous emanations which once were the defilement of all places where men were massed together. To few of her regular practitioners and professors does medicine owe more than to this modest and industrious son of our National Church.

In our day two similar representative men have by their labours honoured both professions. The late Rector of Bishopsbourne, for many years my most intimate friend and co-worker in science, the Rev. J. B. Reade, F.R.S., was one of the really learned in physiological medicine. He anticipated me in the discovery of ammonia as a product of respiration; and when his laborious life was near its close, he was carrying on one of the most singularly interesting inquiries, of a microscopical character, on the blood. Yet he often told me that these scientific pursuits never lessened his love for his own calling. On the contrary, his knowledge of the human body and

of the laws of life strengthened him in the performance of his clerical duties, and, by making him more familiar with man as an organisation, made him more competent to deal with man as a reasoning being amenable to reason. Still living amongst us, we have a fine example of one who blends the two professions in himself, in the Rev. Dr. Haughton, of Dublin, a physiologist of the first rank, and a man whose mind is attuned so perfectly to his whole duty, that whether he be accepted as clergyman or physician, he stands equally valued and worthy.

Outside the National Church of England two other men engaged in clerical functions stand forth prominently as discoverers in medical science. The first of these, Nicholas Stenon, the distinguished Bishop of Heliopolis in the Church of Rome, is the most remarkable. No propagandist was ever more active than Nicholas Stenon; no anatomist was ever more original or profound. Stenon's duct, the duct leading from the parotid gland into the mouth, is still known by his name. Stenon's dissections of the heart, and demonstrations of the figure-of-eight fibres of that organ, are still copied. Stenon's discovery that the contractile structure of muscle is the fleshy and not the membranous part of the muscle, was one of the greatest observations that has ever been made in animal anatomy. He was, as Haller defined him,

‘Vir industrius, candidus, innocuus, et magnus inventor.’ The second man to whom I refer was that wonderful scientific genius, the Nonconformist preacher Joseph Priestly; a man who, by his discovery of oxygen gas and its nature as the supporter of life, takes one of the first places of honour amongst the medical investigators of the last century.

That examples such as these are to be found is in no way remarkable; rather, I think, it is wonderful that more frequent occasions for mentioning them do not occur. Everyone who thinks at all must feel that between the two professions there is a bond of union so subtle that no line of distinction is to be found as a line of natural separation. The division has been made arbitrary and distinct by an artificial demarcation, which I hope will soften down materially in the next few years, to the benefit not only of ourselves, but of the world at large. It is a hopeful sign of this desirable closer communion that I, a minister of medical science, should thus be permitted to speak from this place to you, the ministers of religion; a sign so important, I could well have wished that some more aged, if not more earnest, representative of the art of healing had been asked to undertake so entirely original, so delicate, so responsible a task. But you have confided in me to speak, and therefore I rest on your kindness.

As I proceed to take up the text that lies before me, 'The Inter-relationships of Clerical and Medical Functions,' the first inquiry that strikes me is—Where are the relationships the closest? Where should we be most of one accord? I mean particularly:—Where should we be of accord in practical labour? Setting aside everything that may be called doctrinal in either profession; meeting as on one common field for the common good, where do our labours coalesce? Where can we join to do work together in the same spirit, without interfering with special functions? On what ground do we all still remain both priests and physicians? If we could see this land of union, we should see, indeed, a land of promise for the world!

Let me say at once, without wishing to offer a word which savours of boasting, or which the universal voice does not endorse, that in some respects we do unite in a manner that is not common to any other professions. I refer to the natural readiness with which we lend ourselves to fulfil Lineacre's third desire,—to help the fallen. In all works of true charity, whether it be in delivering a sermon for the aid of the weak and afflicted, or writing a prescription or performing an operation for the same, we have a common sympathy and a common pride. No thought of worldly gain impels us to these sacred duties. No jealousy of labour lessens our mutual activities.

Our relationships are fairly close in the matter of education, and the spread of education throughout the world. If it be that our medical duties take us further from the library and the study than yours do ; if it be that the noble task of distributing knowledge from one living torch to another has been more distinctly your privilege than ours, we physicians have not been slow to second you in your efforts. Observers of natural things rather than of books, we have produced our great natural scholars. Our Keplers, Harveys, Galvanis, Linnæuses, Hallers, Cuviers, Owens, Youngs, Hunters, have constructed the study of natural history. To these we have added such great scholars, even in books, as Mead, Arbuthnot, Friend, Locke, Akenside, Goldsmith, Adams, Willis, Latham, Bartholomew Parr, and many more whose names are as familiar to you as to us, and who stand almost as well with you as do your own Jeremy Taylor, Barrow, Hooker, Pearson, or Tillotson. In a word, we have stood shoulder to shoulder in those great diffusions of knowledge and interpretations of knowledge, in the absence of which the world would have lost some of the best and noblest fruits of knowledge. In the progress of civilisation the Divines and the Physicians have been related throughout their history.

We are again closely related in what may be considered the pure social life of the world. The

first expressed wants of every community, so soon as it is organized, are for the teacher of religion and the healer of the sick. In large public institutions many offices undergo change, are removed, are allowed to die out. But the offices of the chaplain and the doctor remain through all untouched. In every village and town of the kingdom the special personal influence of the clergyman and the doctor is universally recognised. The rich man,—esquire or noble,—may exert more territorial influence; but the hearts and minds of the people, their mental and physical weaknesses and strengths, their affections and their confidences, all lie with the two ministers of mind and body who are *de facto* members of every family, great and small, in which their faithful ministrations are a part of the duties of their lives.

I am describing now what has been and is, rather than what may be. It is in vain for either of our professions to deceive itself on this one point, that with the advance of learning throughout the masses our direct influence is on the severest trial. To use a plain but significant expression, 'we are on our mettle.' We are no longer isolated centres of power amongst the masses. True, it is still our duty to carry on our special ministrations and by them to hold a definite position. True, the particular sphere of the clergyman is still the church. True, the particular sphere of the

physician is still the hospital or the sick chamber. But both must, in these days, spend almost equal time in the open places of the world, and in these open places so closely are our duties united they are practically as one for the service of the world.

I agree to the letter with the teaching of an admirable lecture delivered last session before this Homiletical Society, in which the lecturer defended the practice of division of a subject into distinct heads. I shall follow, on this occasion, the time-honoured custom there so ably defended, and shall endeavour to treat:—

First: On the inter-relationships of clerical and medical functions in things that relate to *physical* health.

Secondly: On the inter-relationships of clerical and medical functions in things that relate to *mental* health.

In the combined study of these two subjects, we stand on safe and common ground. For it is our combined function to check physical and mental evils at their roots. As our special labours are rendered more easy of fulfilment when such primitive and preventive measures have been applied, so in learning the art of prevention we, clergy and physicians alike, enter as learners the same vestibule, and as teachers minister in the same open sanctuary of the world of life;

mission bearers of the truth. The academic vestments that distinguish us fall from our shoulders, and we stand amongst men as one class, exposing the same truths, enforcing the same practices, promising the same rewards for virtue, declaring the same penalties for vice, checking the same ignorances, promoting the same advancements, and practically using the same arguments. We are building up sound minds in sound bodies, and preparing the world for a better and more exalted earthly life.

Our common labours concentrate in the study of all deranged conditions of mind and of body, of sins and diseases in past and present generations. We read together the origins of these deranged conditions of the past; we examine in the present the influence and the action of such origins, not only as they have come from other generations, but as they are being re-established in or produced by our own.

I. Turning to the first head, the physical health of man and the studies of that health which affect us conjointly, we see at a glance that in everything which touches this domain of knowledge we are as one. If you ministers of religion speak to a man who is living in a state of physical impurity, the temple of whose soul is exposed to every danger and irregular disturbance, your voices, though they were the voices of angels, were half destroyed. The senses unfitted for

the reception of the pure, the beautiful, the holy, cannot convey your meaning to those hidden chambers of the mind and heart it is your wish to penetrate. If we physicians prescribe for a man so placed, our wisest measures, though they commanded the authority of Æsculapius himself, were so much loss of time and effort. Give me the management of the fire, the window, and the door of the sick man's room, and all my learned colleagues in Pall Mall shall be summoned in vain to that sick man's aid. What, then, of treatment yet more refined, when the external elements are polluted, and the immediate elements of vice commingle with the material elements of pollution?

Let us move, as a beginning, to a contemplation of the means that are fittest for securing the birth of the healthy. The Church, with exceeding wisdom, has legislated for many ages on this subject. She has ordained the limits of marriage as between certain degrees of consanguinity. The moral aspect of marriage is no doubt here the primary thought; but the physical lies close behind it, and both correlate. In the whole range of our common studies there is no subject of profounder interest for us than lies here for our contemplation. The physicians taking on this point the lead, in matters of physical investigation,—a lead natural to their studies,—have traced the origins of disease into sources antecedent, actually, to the birth,

of those who are diseased. I do not speak now of diseases which are developed simply in the offspring while in the womb of its mother, but of diseases which go farther back than this origin, which go back three and even four generations, and which, once implanted, require another relay of three or four healthier generations before they are wiped out. We Physicians have traced in this class of disease, in diseases originating as described, many very definite maladies,—scrofula, consumption, cancer, rheumatism, gout, insanity, chorea sancti Viti, syphilis, and the whole and varied train of alcoholic affections. Each new day of observation adds to the list, so that from a careful study of all the facts we have been led to the conclusion that nearly all the phenomena of disease have a certain degree of hereditary bearing. There is even a hereditary tendency to contagious diseases, like scarlet fever, diphtheria, and typhoid.

It may appear, on a hasty glance, that a study of a question of this nature is of the purest medical order; that it touches clerical function at no point. As we look more carefully, the facts are seen in a very different light, and as we move into a new position to look at them, they present a new aspect under the different light. We discover, as we observe, that all these hereditary tendencies to disease have an origin, in the first instance, out of the body; that in many

cases they spring out of what, in the language of the physician, is called contagion, but what, in the language of the minister of religion, is called vice or sin. The diseases implanted by drunkenness, by passion, by lust, are they not phenomena in the world over which priest and physician are equally concerned in respect to the suppression of their origins? And if under the same head of origins, we include the other diseases which spring from sheer ignorance of the simple laws of nature,—from uncleanness, neglect, imperfect sustenance, improper sustenance, impure air, irregular labour;—if we say of the origins of diseases from these causes, that they too are vices, sins either of omission or of commission, then the view of the field of our common labours is so extended that, as men out together in the wide world, we sink into each other as members of professions the functions of which so closely inter-relate that they become one and the same.

It remains for scholars of your exalted calling to investigate more closely than you have yet done the transmission of evils which are moral and hereditary. Much of the phenomenon of crime, in its various phases, which you have to combat, is of the hereditary stamp; but how far the influence extends is a question that can only be answered by determinate and, if I may apply the term, scientific research. Through

the observations of the excellent and earnest clergymen who fill the office of chaplains to our prisons, all facts relating to the hereditary transmission of crime would be easily attainable, and would be equally valuable to the teacher of religion, the statesman, the physician.

In fine, the inter-relationships of clerical and medical functions on this subject are so combined as to be inseparable. Whether we are learning new facts, or teaching old ones, the work demanded of us is the same ; and I am greatly mistaken if it would not be found, from a review of our combined labours, extending over a few years of observation, that nearly all the physical and moral hereditary evils have a common root.

The clerical and medical functions inter-relate when they are directed to the suppression of all vices which bring in their train physical disease. In none do they need more to combine than in the efforts to suppress the prevailing intemperance of the masses, and to reduce the evils, physical and moral, that spring from the use of strong drink. Our professions deserve, I think, to stand humiliated, in that we, of all men, have not taken the lead towards the reformation of our country from the terrible spell of intemperance. The fact is deeply to be regretted. Happily, at last, and not one moment too soon, we

are awakening in both bodies to a solemn sense of our solemn, our momentous duties ; and I am bold to declare that if we can agree to understand our inter-relationships on this subject, we can do *anything*. Aided by the noble, thrice noble army of laymen who have pioneered this movement against a common enemy, we can make this England sober in one or two generations. But so long as we remain apathetic, the noblest outside labourers must either fail, or, winning by sheer force of knowledge, wisdom, conscience, and courage, must bring us low in their triumphs. Here our common duties, though they proceed together in principle, are distinct in detail.

It is the duty of my profession to show, as it can show to the most perfect demonstration, that this cause of intemperance—alcohol—*is no necessity of man*; that it is a product of the laboratory, belonging thereto, and is out of place when it is used for any other than a purely medical, chemical, or artistic purpose ; that it is no *food* ; that it is the most certain and insidious destroyer of health, happiness, and life.

And while it is our duty to teach these truths of science, it is yours not only to stand by them as demonstrations indisputable, but to back them up by your ever-potent, ever-present moral influence and decision ;—to add, as you can better than all the world

besides, that eloquence of exposition, that persuasion, and that practised reverential argument which, to those who even assume to despise it, is a resistance beneath which they fall.

And while in this manner, with shades only of difference in action, the functions of the two professions co-relate, in yet another direction bearing on this same subject they should not merely co-relate but be as one. I mean in the example of *abnegation*. We shall be better ministers, better physicians, better men, if we practise abnegation from alcohol. But this mere selfish result of the practice is as nothing compared with the national result that would follow upon our example.

The functions of the clerical and medical bodies might conjoin well in another sense, bearing upon the necessities of mankind for the sustaining of animal power by food. The ministers of the Jewish religion are here in advance of ministers of other forms of religion, and to some extent even of the professors of medicine. Practically the Jewish ministers supervise the food, so as to see that it is free from disease; and although their inspectors are often illiterate men, they are so well trained as to what to observe, that the chance of a Jew obtaining animal food that will create disease is all but impossible. It would be vain to suppose that ministers, other than

the Jewish, could conduct or superintend the same supervision ; but it is very important that the clergy should join with the medical body in all efforts to institute some similar supervision, to be carried out by municipal or central authority. A number of physical diseases would be saved, some of them of the most painful and revolting character, if the Jewish system, not of killing, nor yet of preparing, but of inspecting and selecting foods, were rigidly enforced.

In the matter of temperance in eating and economy of food, the members of both our professions might work together most usefully. It is the fact that the large majority of the people who are well-to-do eat far too much food of all kinds. Some eat twice as much as is necessary, and not a few eat four times as much as they really require. I am quite sure that on the food that is now taken in excess by the wealthy, on the food that is wasted in great banquets, on the food that is prepared to indulge a wanton and proud and mock hospitality, and on the food that is actually cast away from the table, three English populations might be healthily, wholesomely, and comfortably sustained. In correcting this vast and unpardonable waste, this fountain of extravagance, this shameful example of the risen to the rising generation, the precept and example of the

clergyman and the doctor would be of incalculable benefit to all classes of modern society.

The reference I have made to the Jews and to their careful supervision of food, suggests to my mind another Jewish custom which our professions might well combine to introduce and enforce. I refer to the perfect cleansing of dwelling-houses, and of everything within them, which the Jewish community systematically carries out once in the year. The strange immunity of the Jews from the ravages of pestilential diseases, even under circumstances of a social kind most favourable to them, can, I think, be fully accounted for on this ground and on no other, that by the yearly complete cleansing of the house, the accumulation of the organic substances which act as the poisons of the spreading diseases, is prevented. Once in twelve months certainly the Jewish house is absolutely cleansed of the perilous stuff that plagues are made of. I see no reason why, by the united efforts of the clergyman and the doctor, this same custom, so orderly, so cleanly, might not be extended to the whole of our population. I once asked a learned Jewish physician, who was enthusiastically describing the effects of this general purification, how it was carried out so effectively, and his answer was very striking. 'We Jewish physicians,' he said, 'approve it, endorse it, enforce it; but it is really carried out

because it is a part of the discipline of the synagogue.' It struck me that a more forcible example of the inter-relationships of clerical and medical functions could not be adduced, nor a more cogent example of the value of the relationship.

II. The inter-relationships of clerical and medical functions are well seen in the study of the labours to which I have already adverted. They become, however, more intimately connected when we see the considerations that are involved in the second division of my lecture;—when we touch on those refined physiological and psychological problems which relate to the bonds of union between organized matter and organic motion, between the substance of man and the acts he performs, the sensations he experiences, and the thoughts he translates into words. In these studies there does not even appear a tinge of separation between the labours of the two professions; the field of observation is equally interesting and equally common to both, and the world applies to both, with equal desire, for education, advice, and aid on the subjects which are included in the human phenomena that are here opened to view.

It is natural, it is a necessity springing from our work, that we physicians, who day by day throughout our lives are studying and treating the natural organization of man in its living, in its functional, in its

diseased, and in its dead conditions, should become specially impressed with the material side of life ; and I venture to say there is not a clergyman living who would not be similarly influenced and impressed if, by accident of education, he had been brought to our work. It is natural, on the other side, for you, who are daily and hourly dealing with spiritual teachings, to lift your minds above what seems to be the grossness of the material universe, and to look chiefly at the heights and depths of the unspeakable wisdom and power that framed the whole. It is natural, it is almost a necessity, that you from your points of view should become specially impressed by the sublime nature of the message which you attempt to receive and to unfold. I venture to say there is not a physician living who would not be similarly influenced and impressed if, by accident of education, he had been brought to your work. Judging for myself, by myself, I am sure that under such circumstances I should have been lost in it, and should, I doubt not, as a reward for my earnestness, have been considered one of the most bigoted priests that ever approached the altar. Stenon himself was not a more energetic propagandist than I, but for mere accident, might have been. To sober and evenly balanced minds these reflections on difference of thought only indicate, however, that the border-land between them is

indefinite, and that the field really belongs to both. If there were no human bodies to be studied, there would be no spiritual ministrations, none to minister, none to be ministered to. And so I think the wise clergyman will ever be ready to move with the physician in the study of the organization through which, under the direction of the Divine will and wisdom, the manifestations of life and action are developed and sustained. Supposing we agree on these points, then, there is common work for our united functions of a kind so practical that it may pass for commonplace amongst the masses, and be accepted by them as nothing more than common-sense duty. The temptation is strong to touch on some refined topics of discussion here, but I will keep to the practical.

Our functions combine in the study of mental health, and in the treatment of the morbid passions of mankind. The Church, from its very foundation, has been teaching the subjection of the passions. The Church, acting on the words of one of its apostolic founders, has from its foundation been teaching the dualistic nature of man, and that the instinctive animal part of man is ever at war with the finer and reasoning consciousness, which endows him with something which separates him altogether from the lower creation of living things. This which the Church has taught so long by her,—shall I say dogmatic?—voice, is now a

demonstration of modern medical science, so clear that every student may learn it in his first academic session. We physicians not only accept the fact, but we are able to understand the physiological, the anatomical, and, I may add, the pathological bearings of it. We have learned that the centres of the emotional faculties, the centres that are excited or paralysed in the periods of rage, fear, undue sense of desire, ecstasy, hate, love, grief, are not the centres of the reasoning faculties, but are a distinct organic chain of nervous matter common to all animals that possess a semblance of nervous system. We know that these emotional centres, though intercommunicating with, and though to a large extent controllable by, the higher centres, are yet truly a definite system of themselves, impulsive, involuntary, and, if uncontrolled by the exercise of the reasoning centres, wild and dangerous. As animal centres, they are necessary and essential for the animal wants, for the building up of the organism, for the reproduction of the organism in the form of offspring, for the protection of offspring, for the protection and vindication of self, and yet dangerous if so excited as to exert supreme sway and to make the man the equal companion of the lower class of animal being.

So far, then, in the medical advance of learning, we have come up with the grand teaching of the

Church on the subjection of the passions. But in our way we have made another advance. We have discovered that the indulgence of the passions, and the excitements from the passions, lead to direct physical disease and death :—that the moral death, in truth, which the Church proclaims, is not more certain than the physical death which the physician recognises and expounds.

I could give you illustration upon illustration of this order of facts. Let one suffice.

There is a peculiar form of disease of the circulation, a nervous derangement of the heart, in the course of which the beating, forcing heart loses something of its natural stroke and tension. The heart beats and hesitates ; stops for a moment in its motion, and then, with confused impetus, goes on again. When you listen to such a heart, it is as if you were listening to a clock the ticking of which was several times in a minute interrupted, and which then went on again with a commencing faint and uncertain tick. This in many persons becomes a confirmed disease, and, what is more, it becomes a true hereditary disease. In its worse forms it renders some who suffer from it of uncertain mind and power. Their brain is not regularly and systematically filled with blood ; their vessels are not at all times of equal tension. In the worst instances, owing to the repeated indecision of action, these sufferers are disposed to sudden impulses or to

melancholy, and in extremest instances even to suicide. We say of these people that they are broken-hearted. Why? The answer is of singular interest.

From a long and experimental study of this form of disease, I have ascertained that as a permanent disease it is dependent entirely on paralysis or failure of those centres,—those instinctive centres of nervous power,—which govern the involuntary organs of animal life, including amongst the others, and most importantly of all, the pulsating heart. And yet another truth have I learned on this subject, namely, that whenever this diseased condition appears in the young or middle-aged as a confirmed condition of disease, and when it has not come down as an hereditary taint, it is induced solely by one cause,—the exercise and indulgence of the passions, or the excitement of emotion due to some accidental provocation. Violent anger, extreme ambition, fierce contest, sudden fear, intense hate, too ardent love, overwhelming grief,—these are the causes which lead to the intermittent circulation that promotes so many subsequent evils, and impairs, alike, the mental and physical usefulness of those who suffer from it. In the unusually large experience I have had of this condition, I have not met with an instance in which it was traceable to any other cause than the influence of the passions, except where it was of hereditary development.

To be able to connect, in this manner, physical

with moral disease as results of the same controllable human cause, is of singular value to all scholars. To both our professions the knowledge of the connection is a distinct and, when duly appreciated, necessary part of practical knowledge. It cannot, I think, fail to be useful to the minister of religion to have it in his power to add to his teachings to the over-passionate man, or woman, or child, the certain truth that the over-indulgence of the passions leads as surely to physical destruction of life as to moral degradation; that under the continued excitement mental and physical suffering will combine, and that the course of the physical suffering, traceable by the simplest processes of observation, is as regular in its development as any of the set courses of natural law.

Again, to the teacher and adviser in both fraternities, the knowledge of the existence of such physical incapacity, and the nature of it, is most useful for guiding the teacher in the management of those who are affected. The indecision, the impulse, the errors of judgment, the melancholy, which characterize those who suffer from the loss of central nervous energy, are signs too often misinterpreted by the uninformed, and treated as if they were crimes or offences demanding punishment, rather than by that gentle soothing kindness and encouragement which come as the only healing balms which the minister of mind or

body can supply. In all these examples of treatment the inter-relationships of clerical and medical functions are united when they are truly comprehended; and the effect of the unity of action, if it do not cure, must needs be a double element of relief, a double infusion of hope and of happiness.

The study of the passions and their influence suggests another subject which belongs to our respective vocations, and which in some respects more closely affects yours than mine. I allude to the educational methods at present in fashion for forcing knowledge, or assumed knowledge, into the minds of the young by competitive strife for the first place. This method is indeed, after all, but a method for calling into violent action the passions of the young, and for making the yet puerile reason their abject slave. The effect is the same as that above described in regard to physical health. The motion of the heart of the competing scholar is rendered irregular, intermittent, enfeebled; the brain unsteady for work; the mind dissatisfied; while the onward expanding growth of the mental faculties is crippled and prostrated. Scarcely a week of my professional life passes in which I fail to receive from one or other of the great seats of learning or examining boards a martyr of this type.

The offence of man against the Divine ordination

which regulates human progress is, I assure you, in this matter very solemn. It is the introduction of a system for the perfect development of intellectual sterility. By it the lustre of genius loses its brightness, while the world also is robbed of that industrious perseverance which next to genius in its brilliancy, and surpassing genius in its steady strength, has made our nation so great and powerful.

In the correction of this supreme error, in the chastisement of it by exposing and denouncing it, our two professions have a common task. The fruits of the errors will multiply as they grow, and unless they be uprooted it will soon be past our power to control or remove them. To the present physical evils, already sufficiently gross, aberration of mind and suicidal mania will be superadded, and the tendencies so implanted will be transmitted to succeeding generations in hereditary line. In the crusade against such aberrations the functions of the clergyman and physician fit together in unmistakable communion:

The inter-relationships of clerical and medical functions are found, once more, in the efforts that are required to curb another form of passion in which the element of fear is the leading influence, and which may rightly be called 'the passion for the supernatural.' The wisest Fathers of the Churches have at all times tried to hold this passion in steady check,

and the Churches that have retained the most permanent hold have continued resolute in this course. The passion I now refer to is a form of hallucination having no moral bottom to it, no desire of reading the sublime works of the Supreme Ruler of the universe, but is a mere rude and vulgar wish to lift the curtain that veils futurity, and to hold furtive and foolish converse with the mysterious dead. It is a passion daring as it is wild. You know what effects these incanted visions have on weak and unreasoning emotional minds. We also know the effects. We see those minds passing into that fixed aberration to which we give the name of insanity! Living death!

To curb this passion for the supernatural,—a passion that has no support in the teachings of the Church, and no basis in the teachings of science,—is surely one of the most prominent duties to which the combined energies of the clerical and medical bodies can be devoted. From what I can learn, the large majority of both professions are of one mind on this matter. Neither has been led away. Both probably in their own individual circles have striven, and successfully striven, to correct the dangers they have seen ahead. But that we should understand each other on these points, exchange understandings and combine in action, is the best safeguard for the uneducated, and the best proof we can give that we

are alive to duties which, though they may appear out of the order of professional routine, are in truth distinctly a part of our legitimate work as *ministers*, in the purest sense of that expressive term.

Connected with this same branch of our common pursuits there is opened a survey of that form of aberration of mental or bodily function, or sometimes of both, to which we physicians have recently given the name of 'disease from moral contagion,' epidemic moral derangement. The derangements included by us under this title are in some instances purely motional; that is to say, they consist of some simple, though often extreme, perversion of the muscular movements of the body. In other instances they are ideational and emotional. In a third class motional aberration is combined with emotional and ideational irregularities. Thus we have, under this division of deranged action, phenomena ranging from ordinary St. Vitus' dance, paralysis, and hysteria, to tarantism, dancing mania, and imitative suicidal mania. These forms of diseased action have singular alliances with the purer forms of physical disease. I have no doubt they are hereditary; they are certainly contagious; and they appear in the epidemic form. They present, like the true epidemics, points of development from one centre, periods of maximum intensity and decadence; and in some examples

they actually alternate with a physical epidemic, dying away before it or superseding it. Those persons, moreover, who are most readily influenced by one epidemic condition are also by the other, so that in the midst of a true prevailing physical outbreak of disease there are many examples of mere imitation, so forcible in imitation, that the acutest physician finds all his powers taxed to separate the imitative from the real.

In the study of these phenomena we stand once more on common ground,—students of the same school. The phenomena intrude into both our domains, and in the ignorance that still prevails regarding them, I can conceive of nothing that would tend more to enlightenment than the conjoint investigation of the phenomena by some of the members of our learned fraternities.

In the psychological field of work in which we are each engaged, the clerical and medical functions co-relate in the study of the phenomena of temporary mental depression and unhappiness of mind. You are often appealed to on this head, and are embarrassed by the dark picture which men and women of the purest character will give you of their condition. We physicians have, constantly, similar experiences. I have known both clergymen and doctors who have been specially susceptible on this account, though

doctors who lead an active out-of-door life are more rarely affected in this way. In these phenomena the physician, as a rule, reads the existence of a physical cause, and late research has been active in explaining the cause. It is all but capable of demonstration that, under unfavourable conditions of the bodily health, we produce within ourselves physical compounds which, by their action upon it, so becloud and derange the nervous matter that both the reasoning centres and the emotional centres are disturbed and depressed.

I have myself been able to trace to some extent the nature of the physical agents which are so produced in the body, and are the cause of some of these phenomena. The agents are, I believe, organic compounds containing sulphur ; substances which, in perfectly healthy conditions, are thrown out of the system by the bile. I have observed the singular fact that an allied organic sulphur compound called 'mercaptan,'—a volatile sulphur alcohol,—induces, when it is inhaled, a temporary melancholia so determinate and so closely allied to the phenomena I have described above, as really to present no point of difference. The fact, indeed, is clear, that melancholic brooding may have a physical as well as a moral cause, and that even in this refined branch of investigation the studies of the divine and the physician have a common bond of union.

And now, my reverend friends, the passing hour gone by, the task you have invited me to perform is well-nigh done. I have but one thought more to leave with you to-day. How shall we members of the two professions more closely unite in heart, in mind, in duty? The question is of the first order. Our union is sanctioned by the holiest of holy examples, and some of your worthiest dignitaries have hoped that once again it may be perfected. It was the life-dream of the late Bishop of Exeter to commence this work by the institution of a medical diaconate; and in the bright days of the future the union will, I believe, occur in natural order of time and circumstance of learning. If the union be impossible now, it may be prepared for, and I see no better mode of preparation than by the establishment, in our great seats of learning, of a professional course of study in which students of both ministries,—for medicine is a ministry,—shall meet on the same ground, study allied subjects, and prepare for either ministry. To the forwarding of such a noble enterprise, the labours of this learned Homiletical Society might well be directed. Completed to the success indicated, the effort would lend a new and grand significance to Lineacre's dying bequests for:—'The glory of God, the true art of medicine, the help of the fallen, and the increase of this realm.'

IV.

LEARNING AND HEALTH.

IN this day the cultivation of the mental faculties is made to hold the first place in education. There be some who still maintain the superiority of physical over mental culture, and there be many who insist on the necessity of a high degree of physical culture of a certain extreme and artificial kind. But, as a rule, the favour once too exclusively tendered to a purely physical training is on the decline. The admiration which once was bestowed on men of great strength has almost ceased in civilised circles. Physical strength may, if it show itself in some singular and abnormal manner, create for a time an excitement and noise, but the excitement ends in the silence that follows clamour. Men who perform great feats of strength are no longer heroes to be courted and immortalised. Hercules himself would be a nine days' wonder in these days. The evidence now is fairly clear, moreover, that men

who even combine heroism with physical power are not the demigods they were. In war the man, in these days, who displays the deepest skill and cunning in the management of troops is the great general. It is not necessary that he should lead a column or expose himself to danger for a moment. His power lies in his knowledge, and his knowledge is his power.

To attain knowledge is one of the most desired objects, and so much of admiration of man for man as yet remains,—it is not really very much,—is expended on those who show the greatest mental gifts or possessions. The admiration, estimated at its true value, feeds vanity rather than veneration. Men who wish to be honestly admired see no mode of having what they long for except by the acquisition of knowledge and the toilsome display of it. They are frequently disappointed; more frequently, I fancy, disappointed than satisfied, when they even attain all they aspire to as scholars. They feel themselves, perhaps justly know themselves, to be great scholars; and yet, how little are they recognised above the common people who are well-to-do and are no scholars at all! But what other course is open to laudable ambition?

There is in this way induced, therefore, a strain after knowledge as a means of getting that remaining

part, that skeleton of distinction which so soon will be put up as a curiosity of the past.

The acquisition of much knowledge has, however, another meaning and object beyond mere ambition. In this so-called practical day it is imagined that knowledge must be extended without limitation amongst the young, in order that it may be limited without extension amongst those who have passed their youth, and have become engaged in the practical affairs of life. School days and student days must be given up to the attainment of mastery over subjects included in the whole domain of the human understanding. The days of active life, in which men are made or marred, must be devoted to the perfect mastery, or supposed perfect mastery, of one particular subject. Branches of great divisions, and in time branches of divisions of great divisions, and in time again branches of little divisions derived from the secondary divisions, must be made the subjects of special study by special men.

It is very singular to observe in common conversation the expression of these two lines of mental activity. A fond parent, speaking in terms of admiration of his son at school, unfolds with pride the school report. His boy has been working with a zeal that cannot be too much applauded. In that monthly report sheet the lad has the highest number

of marks in Greek and the same in Latin. He fails only one mark from the highest in Latin exercise, he is equally near to the top in French, and in German he is but one lower down. In what is called 'English' he is third. In Grecian history he is second, in Roman history first, in English history fourth. In geography he is first, in chemistry fifth, in natural philosophy second, in mathematics third, in algebra third, in arithmetic first, in mental arithmetic second, and in writing fifth. Poor boy! what a month of close work has been spent on that long list. Four hours of school in the morning, and three in the afternoon have thus been spent, with lessons after school, directed by an intelligent and active tutor devoted to the progress of his pupil,—a very determined though an exceedingly kind man,—for three hours and sometimes four hours more.

The father is delighted with the progress of the son. Suppose, however, you take the father on these very subjects, and see his position in respect to them. In nine cases out of ten you find that for him such learnings are vanities. He tells you he has no time for the gaining of any information on any other subject save the one which is the matter of his life. You may hear him say of men placed as he is, that they must keep to their single calling. 'Division of labour is the soul of success. In these times, to master one subject is to do all that is required. An accomplished

man! Where is there such a man, and of what use is he if he do exist, which is improbable? An accomplished woman! Yes, an accomplished woman is now and then met with; but she, too, is rare, and not of much use either; but women have more time, and may be excused if they let their minds run after many things in learning.'

This picture may perhaps be thought to have a mercantile or business character of too exclusive a kind. I do not think so. In science the same kind of argument is not wanting in respect to the young and to the middle-aged men. The student of science must, in the period of his studentship, go through the whole range of scientific learning. He must struggle for his degrees and get them. Once through the ordeal necessary for so much successful winning, he must settle down into minuteness; he must find some little point in the great world he has tried to traverse, fix on that, and seek to live on it in competency and reputation. He must touch no one else in his course, and let no one touch him. His magic circle, his ground of specialistic thought, is to be considered sacred. The same fashion,—for I cannot call it a principle,—nay, I cannot, without abusing the word, call it a method,—is maintained in the professions, and in two of them, the medical and the legal, in the most marked degree. A modern medical

student, through the ordinary term of his studies, from the day he enters school until the day he gets his diploma, may work like a galley-slave at the whole world of natural science; and then, having seized his envied prize, may settle in life to the exclusive study and practice of disease of some section of the animal body. To be successful, he cannot draw the line too sharply round his particular pasture. Into that no man must enter unless he have a pasture somewhat similar, and such an one is not over welcome. In deference to other men of other pastures, our man of men must not go out of his own. If he knows another department ever so well, he must not profess to know it,—it is out of his line.

In legal pursuits the same kind of exclusiveness obtains, and I think in some instances in a more exclusive manner than in medicine.

It is fortunate for the Church that, with all her backslidings and troubles, she has not yet tumbled down to so low a position as her sisters have. It is of happy omen for the clergy that they must keep up their learning as general scholars. It is more than happy that in their case division of labour is not recognised as profitable; for if they were to begin to specialise, if one clergyman were to take one sin for special study, and keep to it all his life, and another

a different sin ; if one took up the cure of swearing, for instance, and another of theft, and another of lying, the confusion of the modern learned world would be complete indeed.

This introduction to present modes of learning and application of learning would well befit an essay on the subject of learning as a practical development of civilisation not altogether in accord, as it is now carried on, with the welfare of our race. I trust soon some scholar, whose heart is in education as mine is in health, will be bold enough to declare the unity of knowledge, the connection of it with wisdom, and the utter vacuity that must soon be witnessed if the current fashion be allowed to follow its fragmentary, self-repulsive, and self-destructive course.

To me it falls to oppose the system of modern education as a system destructive of vital activity, and thereby of mental growth. It is my business to declare that at this time health and education are not going hand in hand ; that the whole head is sick, and the whole heart is faint.

I cannot sit day by day to see failure of young brain, and of brain approaching its maturity, and of brain that is matured, and tamely accept the phenomenon as necessary and therefore to be endured. To see the errors that prevail and not to speak of them were to be silent on errors which would lead a

nation into trained feebleness, which would lead to new generations springing out of that feebleness, and to the propagation of a community that would no more be illuminated by those greatnesses of the past who, in less learned but freer times, gave forth the noblest of noble poetry, the most wonderful of wonderful art, and a science, philosophy, and literature that have been hardly mortal. Such a poetry as Shakespeare has poured forth ; such an art as Gainsborough, and Reynolds, and Turner, and Herschel, and Siddons, and Kemble, and Kean have presented ; such a science as Newton, and Priestley, and Davy, and Young, and Faraday have immortalised ; such a philosophy as Bacon and Locke have contributed ; and such a literature as Johnson, and Scott, and Dickens have, in the freedom of their intellectual growths, bequeathed for ever. To me, observing as a physician, the appearance and development of these men, under the circumstances in which they appeared, is the most natural of events, the mere course of Nature untrammelled, regular, and divinely permitted ; not forced, but permitted, Nature being left to herself. To me, observing as a physician, the appearance of such men in similar greatness of form is at this time an all but impossible phenomenon. The men truly may appear, for Nature is always reproducing them, and the divine permission for their development is

equally good now as of yore ; but the development is checked by human interference, and thereby hangs the reason of the impossible. Nature produces acorns for future oaks, and is as free as of yore that oaks should make forests ; but if the young oaks be forced in their growth, and when they are approaching to maturity be barbarously compressed, head and trunk, into narrow unyielding tubes, there will be no forests, nor so much as spare representatives of the forest, amidst the brushwood of commonplace meadow or bare ploughed field of mental life.

If it be true that education does not go hand in hand with health, it is vain to expect that education shall bring forth the first-fruits of knowledge, and, what is more important, of wisdom. My argument is, that the present modes of education for the younger population, and for the older, are not compatible with healthy life ; and that education, therefore, is not producing the mental product that is required for the steady and powerful progress of the nation.

There are many faults in the processes of education of the young which tell upon health in a direct mode. There are faults in the construction of schoolrooms still : there are faults in respect to discipline in schools : there are faults in respect to punishments in school life. I do not at this moment dwell on

these, and for the simple reason that they are departing errors. No one who has watched the improvements which have been made in schools during the past twenty years can fail to see how markedly they have advanced; what care is taken to secure good ventilation; how clean and warm the modern schoolroom has become, compared with the schoolroom of the past day.

No one, again, can doubt that the discipline of the modern school is much more correct than it used to be, and that the manners and customs of scholars in school, and out of school, are superior in every particular. Scholars are cleaner than they were, less brutal than they were, and less subjected to those painful school accidents which, in our forefathers' time, were wont to leave their marks for life.

Lastly, it must be obvious to all that the law of kindness in schools is fast replacing the modes of ruling by the rod, and other forms of punishment, which once stood out as solemn and legalised barbarities: modes which hardened many hearts in their first days, and broke more than they hardened; modes which have left their impress even yet in the men and women whom they trained into transmissible forms of character and mind.

I may, then, leave these departing shadows on the schoolday health, that I may touch more definitely

on the shadows that are now deepening and daily falling.

EDUCATION IN CHILDHOOD.

The first serious and increasing evil bearing on education and its relation to health lies in too early subjection of pupils to study. Children are often taught lessons from books before they are properly taught to walk, and long before they are taught properly to play. Play is held out to them, not as a natural thing, as something which the parent should feel it a duty to encourage, but as a reward for so much work done, and as a rest from work done; as though, forsooth, play were not itself a form of work, and often work of a most fatiguing nature. Play, therefore, is not used as it ought to be used,—as a mode of work which the child likes, but rather as a set-off against a mode of work which the child does not like, and which in nine cases out of ten he does not like because it is altogether unfitted for his powers; because Nature is protesting, as loudly as she can and as plainly as she can, that the child has not arrived at a period of growth when the kind of mental food that is forced on it is fitted for its organisation.

For children under seven years of age the whole of the teaching that should be naturally conveyed should be through play, if the body is to be trained up

healthily as the bearer of the mind. And it is wonderful what an amount of learning can by this method be attained. Letters of languages can be taught; conversations in different languages can be carried on; forms of animal life can be classified; the surface of the earth can be made clear; history can be told as story; and a number of other and most useful truths can be instilled without ever forcing the child to touch a book or read a formal lesson.

Under such a system the child grows into knowledge, makes his own inventory of the world that surrounds him and the things that are upon it, and, growing up free to learn, learns well, and eats, and sleeps, and plays well.

In a child trained after this method, not only is health set forth, but happiness likewise,—a most important item in this period of life. Priestley, who was as good an observer of men as he was of inanimate nature, was accustomed to say of himself, with much gratitude, that he was born of a happy disposition; that he was happy by heredity. So, in all his great trials—in his failures as a speaker because of his defective stammering habit; in his difficulties as a theologian; in his persecution as a suspected politician, flying for his life, having his house burned to the ground and all the treasures he valued most flung out of window to a senseless,

drunken, groaning mob ; in all these trials, and others to come,—the cruel, cutting contempt of his colleagues of the Royal Society, and the final parting for ever, in his old age, from his beloved England that he had served so well ; in all these trials, I repeat, which so few could have borne, he sustained the full share of his hereditary gifts, his mental happiness and health,—or I should rather say, his health, and therefore his happiness.

But this blessed health, which so distinctly propagates itself, is never at any period of life so tried as in the first years. Then it is confirmed or destroyed, made or unmade.

In this period, in which so many die from various causes, Nature herself, at first sight, seems to set up continued irritations. It is only that she seems, for if she were allowed she would do all her spiring gently, even to the cutting of teeth and the modification of digestion to modification of food.

It is in this period that education is too often made for the first time to stand at variance with health. It is in this period that the enforced lesson so often harasses, wearies, and at last darkens the mind. It is in this period that the primary fault is committed of making play a set-off against work, and a promise of a good game an inducement for the persistence in hard labour.

What is constantly attempted to be taught in this period of life is the saddest detail. I have known a regular imposition of work per day, equal to the full complement of natural work for many a man or woman. There are schools in which children of eight, nine, and ten years of age,—and, it may be, younger children still,—are made to study from nine o'clock until noon, and again, after a hasty meal and an hour for play, from two to five, in the afternoon, and later on are obliged to go to lessons once more preparatory for the following day.

The bad fact is, that the work is actually done; and as the brain is very active because it is diverted from its natural course, the child it belongs to may be rendered so unusually precocious, that it may become a veritable wonder. Worse than all, this precocity and wonderful cleverness too often encourages both parents and teachers to press the little ability to some further stretch of ability, so that the small wonder becomes an actual exhibition,—a receptacle of knowledge that can turn up a date like the chronological table of the 'Encyclopædia Britannica,' give the whole history of Cleopatra, to say nothing of the Needle, carry you through a Greek verb without a stop, and probably recite a dozen selections from the hardest poets.

This is the outside of the marvellous picture. Let

us look at the inside of it, as a skilled eye can easily look and read too. These precocious coached-up children are never well. Their mental excitement keeps up a flush, which, like the excitement caused by strong drink in older children, seems like health, but has no relation to it. If you look at the tongues of these children, you see them to be furred or covered with many red points like a strawberry, or to be too red and very dry. If you inquire into the state of the appetite, you find that the appetite is capricious ; that all kinds of strange foods are asked for, and that the stomach is constantly out of order. If you watch the face for long, you note that the frequent flush gives way to an unearthly paleness. If you watch the eyes, you observe that they gleam with light at one time and are dull, depressed, and sad at another, while they never are laughing eyes. Their brightness is the brightness of thought on the strain—an evanescent and dangerous phenomenon. If you feel the muscles, they are thin and flabby, though in some instances they may be fairly covered with fat. If you inquire as to the sleep these children get, you hear that it is disturbed, restless, and oftentimes broken. In a healthy child the sleep comes on irresistibly at an early hour, and when the eyes are shut and the body composed, the sleep is carried out till waking time without a movement of position of the

body. You ask the healthy child about his sleep, and he says that he is simply conscious of having closed his eyes and opened them again. But these unhealthy over-taught children have no such elysium. They sleep, perchance to dream; to dream during half the night, and to be assailed with all the pressures and labours of dreams; passing through strange abodes and narrow crevices which it seems impossible to squeeze into; and waking in a start, in what is commonly called a nightmare, with the body cold, and sometimes in somnambulism or sleep-walking. The bad sleep naturally leads to a certain over-wakeful languor the next day; but, strangely enough, it interferes with the natural advent of sleep the next night, so that sleeplessness at night becomes a habit. The child must be read to sleep, or told stories until it is off; and thus it falls into slumber fed with the food of dreams, worries, cares, and wonders.

In this period of early education,—first stage of what may be fairly called the intemperance of education,—the recreations that are adopted for the little scholar are often as pernicious as any other part of the system in which he or she is trained. During the day-pastimes, a want of freshness and freedom prevails, almost of necessity, in large towns; and this want is often made worse than it need be by inattention or deficiency of means.

In a town like London there are three classes of children, all of whom present different aspects of health.

The children of the poorer people,—the children that play in the open streets and round the squares,—are constantly found to present the best specimens of health in the whole child community. If these children are well fed at home, and have moderately comfortable beds, and are not put to work for hours too long, they are singularly healthy in many instances, even though they be the denizens of courts, mews, and alleys. It is true that numbers of them inherit sad constitutional diseases ; it is true that numbers of them exhibit deformities of the skeleton, owing to the circumstance that during their infancy they were not properly fed with food that will yield bone-forming structure ; still, amongst them are the ruddiest and healthiest of the town communities. They owe their health to the free and out-door life.

There is next a class of children belonging to the well-to-do. These are taken out for walks in the public parks and gardens, or are driven out ; and if they be permitted really to enjoy the outing, and are not harassed with long lessons at home or at school, they are bright and healthy, though it is rare for them to present all the natural ruddiness and strength that should belong to the spring-time of life.

There is a third class of children who, least fortunate, lie between the rich and the poor, and who belong to the middle trading classes. The parents of these children are anxious, for the most correct of motives, that their young people shall not run wild in the streets to mix with children who are of a different class and are under different influences. At the same time, they are unable to send their children out to the parks or suburbs, as their wealthier neighbours are. The consequence is, that these children are kept close at home, or at school. They have to live in small rooms badly ventilated or irregularly ventilated; and, albeit they are well clothed and well fed and comfortably bedded, they grow up all but universally unhealthy.

These children are they who specially suffer from too close work at books and educational labour generally. They are usually very pale, muscularly feeble, and depressed in mind. They grow up irresolute, and yield a large,—by far the largest,—number of those who fill up the death-roll of that disease of fatal diseases, pulmonary consumption.

For fourteen years of my life I was physician to one of the hospitals in this metropolis to which so many of those who are afflicted with consumption find their way. Twice, and occasionally three times a week, the duty of inquiry into the origin of this

disease came to my share of professional work. The field of observation was extensive, and no fact was yielded in it so definitely as this fact, that the larger proportion of the consumptive population has been brought up in close schoolrooms, where the school hours were far too prolonged, and then in close rooms at home, where other work, in confined space, filled up the remaining lifetime.

It is to be confessed that many practical difficulties lie in the way of parents of children of the classes I have just named. But there are no insurmountable difficulties to improvement. An intelligent public demand for improvement would very soon lead to an extension of what are called garden-schools for the young, in which teaching by amusing lessons, or games of learning, in a pure air and ample space, would secure all the advantages which are now so much desired. In our large and splendid Board Schools, which are becoming distinct and beautiful social features of the age, something towards this system is approached, if not attained.

EDUCATION IN BOYHOOD AND GIRLHOOD.

In the education which is bestowed on the young in the next stage of life,—I mean, on those who are passing from the eleventh to the sixteenth or seventeenth years of life,—the errors committed in respect

to health are often as pronounced as in the earlier stage.

This period of life is in many respects extremely critical. The rapid growth of the organs of the body, the still imperfect and imperfected condition of the most vital organs: the quick changing, and yet steadily developing form of mind, which, like the handwriting, is now being constructed: the imitative tendency of the mind: and, not to name other peculiarities, the intensity of feelings in the way of likes and hates:—all these conditions, physical and mental, make this stage of a human career singularly liable to disorders of a functional or even of an organic kind. For one organ of the body, or for one propensity of the mind, to outgrow, or out-develop another or others, is the easiest of all accidents in this stage of life, unless care be taken to preserve a correct balance.

The lines of error carried out in this period run in three directions at least, all tending to impair the healthy and natural growth. The first of these errors is *over-work*, which often is useless over-work. The second is deficient skill or care in detecting the natural *character of ability*; in other words, the *turn of mind*, and, it may be said, *capability*, of the learner. The third is the system of forcing the mind into needless *competitions*, by which passions which are not in-

tellectual, but animal, feed the intellectual soul with desire, and, by creating an over-development of the nervous-physical seats of passion, make or breed a soul of passions which may never be quenched in after life, until it, itself, puts out the life abruptly by the weariness it inflicts.

I have sketched from a trustworthy record the work of learning imposed on a pale and nervous boy at a school, the discipline of which is by some felt to be rather light than heavy. Any four of the subjects therein named were really sufficient to occupy all the natural powers for the work of that young mind, but there are five subjects ;—Latin or Greek, English, Arithmetic, History, and the French or German language, with writing superadded as an exercise. For these exercises of the mind eight hours of work are necessary ; and if this period of labour were enforced, with two hours for meals and ablutions, and four hours for play, it would require all the remaining ten hours, out of the twenty-four, for sleep, in order to supply that perfect renovation of body, that extra nutrition which growth of the developing organs of the body so rigorously demands. The tax is extreme while growth is in progress. But it seems never to be conceived, in respect to the human animal, that growth is labour. To put a horse into harness at too early a time of its life, and to make it work hard as

it is growing, is considered the most ignorant of processes ; while to work a growing child harder probably at that time than at more advanced periods of life, is often considered the most correct and vigilant of processes.

This educational training brings, according to my experience, only one result, a reduced standard of health and life. Boys and girls subjected to it are rendered pale, thin, irritable, feverish, restless at night, and feeble. A thoroughly good diet, and brisk play, and kind and sympathetic encouragement, may diminish the evil, and, I am bound to say, often do diminish it ; but these aids, at their best, do no more than diminish. The root of the danger remains, and for delicate children the aids are a poor shield against the diseases of lungs, of heart, of nervous system, that are ever threatening and giving cause for alarm. How easily such over-worked children take cold during vicissitudes of season, how severely they suffer when they are attacked with the epidemic diseases, the common experience of every practising physician proves. For these diseases are themselves of nervous origin, and find the readiest place in exhausted nervous natures.

So the brilliant boy or girl of the school, whose intelligence has pre-illuminated the world, too frequently dies ; and the dull boy or girl, the hulk of the

school, escapes back to health from variations of it. And alas! say the admiring mourners of the dead, alas! it is true, 'whom the gods love die young.' Alas! it is false, I say. Whom the gods love die old; go through their appointed course, fulfil their appointed duties, and sink into their rest, knowing no more of death than of birth, and leaving no death-stricken mourners at their tombs.

The breach between health and education in the period of studentship now under consideration is further evidenced by the method that exists,—and as a necessity exists in a bad system,—of making no practical distinction between one learner and another in relation to physical capacity and power. It is one of the faults in the system of punishments for those unfortunates who have broken the laws of the land that the same labour is inflicted constantly on persons of entirely different physical power, so that either half a punishment, or a double punishment, may be imposed for the same offence. This is most unfair, even to criminals. It is not a bit more unfair than the system in school classes of setting everyone the same tasks. To take the boy who has an inherited tendency to consumption, or to heart-disease, or to insanity, and to place him under the same mental *régime* as another boy who has none of these proclivities, but is of healthiest parentage, is a crime in its ignorance.

And, when it is the fact that the healthiest boy in a school is, in all probability, himself overworked, it is not difficult to see that the work imposed on other pupils passing from their eleventh to their seventeenth or eighteenth year, makes it impossible for health and education to progress side by side, and develop lustily together.

I said there was a second course of error in education at the period of life now under consideration. That consists in failing to allow for difference of mental capacity and turn of mind in different learners. There are many minds of neutral tendency ; minds that can take in a certain limited amount of knowledge on almost any and every subject, but which can never master much in anything. These minds, if they be not unduly pressed and rubbed out, or flattened down, become in time respectable in learning, and sometimes imbued with the plainest common sense. These minds bear at school much work with comparatively small injury, for they are admittedly dull, and great things are not expected of them, and great things are not attempted by them. These minds do the necessary work of mediocrity, in this world, an important work enough,—the work of the crust of the intellectual sphere.

There are two other very different orders of minds. There is the mind analytical, that looks into details in

business, into elements in science, into figures and facts in civil and natural history. In the school such a mind is good at arithmetic ; good at mathematics ; good at facts and dates ; good at niceties of language. In these directions its lessons are pleasures, or, at the worst, are scarcely labours. There is, again, the mind constructive or synthetic ; the mind which builds ; which uses facts and figures, only, in the end, for its own purposes of work ; which easily learns principles of construction ; which grasps poetry and the hidden meaning of the poet ; which is wonderful often for memory, but remembers the whole, rarely the parts of a theme ; and which cannot, by any pressure inflicted on it, or self-inflicted, take fast hold of minute distinctions.

The true intellect of the world, from the first dawn of it until now, has been made up of these two distinct forms of mind. They seem antagonistic, and they are so ; but out of their antagonism has come the light of knowledge and wisdom. They are the representative poles of knowledge and of wisdom. The first is knowing, the second wise,—two distinct qualities, though commonly confounded as one.

In the small school of the youth, as in the great school of the world, these representative orders of mind are ever present. The mistake is, that they are so commonly confounded, and that no change is made

in the mode of study to suit the genius of the one or the other.

The consequence is that lessons are given to the analytical student which he cannot possibly grasp, and to the synthetical student which he cannot possibly master. Under these conditions both chafe and worry and weary, and still do not get on. Then they fall into bad health, grow fretful and feverish, are punished or slighted, and otherwise made sad, and, it may be, revengeful. And so, if they be unduly forced, they grow up unhealthy in body and in mind. They grow up, feeling as beings who have in some manner missed their way in life. The occupation into which they have drifted, and in which they have become fixed, is not congenial to them; at last they fall into listlessness, and, seeking in amusements and pleasures for the treasure they have lost, are trodden into the crust of the intellectual sphere,—the great mediocrity.

I said there was a third course of error in educational training in this period of life, and I noted that as the prize system, the forcing of young minds to extremes of competition in learning. This system is bad fundamentally. I have been assured by excellent teachers that it is bad as a system of teaching, and that nothing but the demand for it on the parts of ambitious parents and friends could make them permit it as a part of their work. They say it obliges

them, as prize days draw near, to devote excessive time to the most earnest of the competitors. They say that the attention of the whole school is directed towards the competitors, who have their special admirers ; and so the masses, who, from fear or from want of ability, do not compete, are doubly neglected, are neglected by their teachers to some extent, and are forgetful of their own prospects in the interest they take as to the success of their idols. In this way, those that are weakest are least, and those that are strongest are most, assisted,—another illustration of the proverb, ‘To him that hath shall be given ; but from him that hath not shall be taken away even that which he hath.’

I cannot undertake to confirm this judgment myself, though it sounds like common sense ; but I can affirm that in the matter of health, in interference with that blessing, the prize system stands at the bar guilty of the guilty. You have but to go to a prize distribution to see in the worn and pale and languid faces of the successful the effect of this system. And when you have seen them, you have not seen a tithe of the evil. You have not seen the anxious young-boys or girls at the time of the competition ; you have not seen them immediately after it ; you have not seen them between the period of competition and the announcement of the awards. You have not seen

the injury inflicted by the news of success to those who have won and by the news of failure to others who have lost. If you could, as through a transparent body, have seen all the changes incident to these events; if you could only have seen one set of phenomena alone, the violent over-action and the succeeding depressed action of the beating hearts, you would have seen enough to tell you how mad a system you have been following to its results, and how much the dull and neglected scholars are to be envied by the side of the bright and, for the moment, the applauded and flattered and triumphant.

These bad physical results the physician alone sees, as a rule, and he not readily, since the evil does not of necessity appear at the moment, nor does he, nor do others, see the remaining evils from the physical side. It requires a study of the mental condition produced by the competition, of the effect of that condition on the passions, and of the influence of the passions on the nutrition and maintenance of the body, to know or surmise the secondary mischiefs to health which these fierce mental struggles in girlhood and boyhood inflict on the woman and the man.

While this lecture has been in preparation I have received from Dr. Holbrook, the editor of the *Herald of Health* of New York, one of his miniature tracts on Health, in which he records the experiences of men

who have lived long, laborious, and successful lives, and the reasons they assign for having enjoyed such prolonged health and mental activity. The tract before me contains letters from two men of great eminence, namely, William Cullen Bryant and William Howitt. A part of William Howitt's letter so admirably expresses the lesson I am now endeavouring to teach that I quote it in full. It refers to his early life, and its perfect freedom of learning:—"My boyhood and youth were, for the most part, spent in the country; and all country objects, sports, and labours, horse-racing and hunting excepted, have had a never-failing charm for me. As a boy, I ranged the country far and wide in curious quest and study of all the wild creatures of the woods and fields, in great delight in birds and their nests, climbing the loftiest trees, rocks, and buildings in pursuit of them. In fact, the life described in the 'Boy's Country Book' was my own life. No hours were too early for me, and in the bright sunny fields in the early mornings, amid dews and odour of flowers, I breathed that pure air which gave a life-long tone to my lungs that I still reap the benefit of. All these daily habits of climbing, running, and working, developed my frame to perfection, and gave a vigour to nerve and muscle that have stood well the wear and tear of existence. My brain was not dwarfed by excessive study in early boyhood, as

is too much the case with children of to-day. Nature says, as plainly as she can speak, that the infancy of all creatures is sacred to play, to physical action, and the joyousness of mind that give life to every organ of the system. Lambs, kittens, kids, foals, even young pigs and donkeys, all teach the great lesson of Nature, that to have a body healthy and strong, the prompt and efficient vehicle of the mind, we must not infringe on her ordinations by our study and cramping sedentariness in life's tender years. We must not throw away or misappropriate her forces destined to the corporeal architecture of man, by tasks that belong properly to an after time. There is no mistake so fatal to the proper development of man and woman as to pile on the immature brain, and on the yet unfinished fabric of the human body, a weight of premature, and, therefore, unnatural, study. In most of those cases where Nature has intended to produce a first-class intellect, she has guarded her embryo genius by a stubborn slowness of development. Moderate study and plenty of play and exercise in early youth are the true requisites for a noble growth of intellectual powers in man, and for its continuance to old age."

EDUCATION IN ADOLESCENCE.

In the education that is bestowed on the young in the period of their adolescence, namely, from the

seventeenth or eighteenth to the twenty-second or twenty-third years, there is, I regret to say, no redeeming quality in regard to health as an attendant consideration.

Young men and young women who are now presenting themselves for the higher-class examinations at our universities and public boards are literally crushed by the insanity of the effort. It has happened to me within the past year to have under observation four of these victims to the inquisition of learning.

In one of these examples, where success, so called, crowned the effort, in addition to many minor injuries inflicted on the body, an absence of memory has succeeded the cram, so that names of common places are for the time quite forgotten ; while the subjects that were got up so accurately have become a mere confused dream, in which all that relates to useful learning is inextricably buried.

In another of these competitors, the period of competition was attended with an entire absence of sleep, and thereby with that exhaustion which leads almost to delirious wandering of mind. Here failure led to an extreme depression, to a forgetfulness of the reason of failure, and to a listlessness, on all subjects, it will take months to cure.

In the third example to which I refer, sleeplessness, labour, and excitement brought on an hereditary

tendency to intermitting action of the heart, to unsteadiness of power, and thereby to an uncertainty of effort, which almost of necessity led to failure of attempt. Even cram in an instance of this nature backed by all the assiduity that will and patience and industry could support, was obliged to fail because the physical force was not at hand to keep the working body in accord with the mental power. Ignorant of what they were after, the examiners who were putting on their screw were not examining the mental qualities of this youth at all, but were really trying how long his heart would hold out under their manipulation.

In the fourth instance, it was my duty to decide whether a youth, brought up just to the condition for going into the inquisition, should, worn and wearied with the labour, bloodless and sleepless, run the risk,—being quite ready for it,—or should, at the last moment, take six months' entire rest, and then be got up to the same pitch of lifelessness and misery again.

Is there any occasion to wonder at these phenomena? One of the members of my profession has a son who originally was a lad of good parts, and who, after undergoing the inquisition, has had to wander about for months in travel, helpless in mental and physical state—'more like an idiot,' said his father to me, than anything else. Is there any occasion to wonder

at these phenomena, I repeat? None. In some of these inquisitions each examiner can pluck from his own paper, and there are several examiners. Ask one of those examiners to answer the paper of another examiner, and see what he would do. The unhappy student has to answer them all.

The system is doing sufficient evil to men; but what is to happen to the world if women, anxious to emulate, are to have their way, and, like moths, follow their sterner mates into the midnight candle of learning? Up to this time the stability of the race in physical and mental qualities has greatly rested on the women. Let the fathers do what they might,—in this age dissipate and duel and fight; in that age smoke, drink, and luxuriate; in another age run after the vain shadows of competitive exercises, mental or physical;—still the women remained unvitiated, so that one-half the authorship of the race was kept intact as reasonable and responsible beings. In other words, there were mothers as well as fathers. But if in these days women, catching the infection of the present system, succeed in their clamour for admission into the inquisition, and mothers thereupon go out, as they certainly will, just in proportion as they go in, the case will be bad indeed for the succeeding generations.

Some wise man has given us, if we would read

his lesson correctly, the moral of this kind of effort in the wonderful story of Babel.

It is quite true. You cannot build a temple that reaches to heaven, though all the world try. It is not, that is to say, by forcing the minds of men to learn, that man can penetrate the secrets of nature and know them. If one learned man could seize and hold and apply the knowledge of two learned men, there might be a progression of knowledge in geometrical ratio, and soon, in truth,

Men would be angels, angels would be gods.

To this Nature says *No*; and when the attempt is made, she corrects it by the interruption she sets up, through the corporeal mechanism, to the mental strife and contagion.

To let this struggle against Nature progress up to confusion of tongues, in which one learned man shall not understand another, is a far easier thing than many suppose; for Nature is unswerving in her course, and the struggle now is far advanced towards its natural consummation.

For a time yet it may be necessary to subject men who are to carry out responsible professional labours, in the practice of which life or property is concerned, to certain efficient tests as proofs of knowledge and skill. Such examinational tests may easily

be conducted without being made in any sense competitive, and without in any sense doing an injury to health and life. But at best, such tests are arbitrary, and define no more than the capacity of the man at the period of his entry into manhood. At that period there is presented but one phase of mental life among many varying phases; and to let the brand of superiority stamped at that age, however distinguished the superiority then may be, stand forth as the all-sufficient distinguishing mark for a lifetime, would indeed be, and indeed is, injustice and foolishness.

It is a very bad system that suggests such a mode of obtaining a claim to permanent superiority, and the effects of the present system are shown in their most mischievous character in this very particular.

The man who succeeds in gaining the great competitive honours is usually content to rest on them, and rarely wins other distinctions in after life. It is doubtful, indeed, whether the training is not fatal to the after distinction, and whether the great geniuses of the world would ever have appeared at all, if, in their early days, they had been oppressed by the labour, strain, and anxiety of the competition, or had been bound by the hard-and-fast lines of the dogmatic learning upon which the competition was based. I believe myself that brilliant after-distinc-

tion is altogether incompatible with early competitive superiority gained by the struggles I have indicated, and that the evils now so widespread amongst our better-class communities will find their full correction in the circumstance that the geniuses of the nation and the leaders of the nation will henceforth be derived,—unless there be a reformation of system,—from those simple pupils of the board schools who, entering into the conflicts of life able to read, write, and calculate, are left free of brain for the acquirement of learning of any and every kind, in the full powers of developed manhood.

Be this as it may, I am sure that the present plan, which strands men and women on the world of active life, old in knowledge before their time, and ready to rest from acquirement on mere devotion of an automatic kind to some one particular pursuit, is directly injurious to health both of body and mind.

Continued action of the mind and varied action of the mind are essentials to length of life and health of life, and those brain-workers who have shown the greatest skill in varied pursuits, even when their works have been laborious, have lived longest and happiest and best.

The truth is, that when men do not die of some direct accident or disease, they die, in nine cases out of ten, from nervous failure. And this is the peculiarity

of nervous failure,—that it may be fatal from one point of the nervous organism, the rest being sound. A man may therefore wear himself out by one mental exercise too exclusively followed, while he may live through many exercises extended over far greater intervals of time and involving more real labour if they be distributed over many seats of mental faculty.

Just as a sheet of ice will bear many weights if they be equally distributed upon it, but will give way and break up at one point from a lesser weight, so the brain will bear an equally distributed strain of work for many years, while pressure not more severe on one point will destroy it in a limited period, and with it the body it animates.

CONCLUSION.

Let health and education go hand-in-hand, and the progress of the world, physically and mentally, is sound and sure.

Let the brain, in the first stage of life, make its own inventory : distress it not with learning, nor sadness, or romance of passion. Let it take Nature as a second mother for its teacher.

In the second age, instil gently and learn the order of mind that is being rendered a receiving body : allay rather than encourage ambition : do not push on the strong, but help the feeble.

In adolescence, let the studies, taking their natural bent, be more decisive and defined as towards some particular end or object, but never distressing, anxious, or distractingly ambitious. Let this be an age for probation into the garden of knowledge, and of modest claim to admission there; not for a charge by assault, and for an entry with clarion and standard and claim of so much conquered possession.

And for the rest, let the course be a continued learning, so that with the one and chief pursuit of life other pursuits may mingle happily, and life be not

a dissonant thing
Amid the universal harmony.

My task is done. I find no fault with any particular class, either of teachers or pastors or masters. I speak only against a prevailing error, for which no one is specially at fault, but for which all are somewhat at fault, however good the object had in view may be.

What we now witness in the way of mental competition is but the old system of physical competitive prowess in a new form; and when the evils of it are seen, and when the worse than uselessness of it is detected, it will pass away as all such errors do after the universal mind which sustains them sees and appreciates the wrong that is being done. I

believe sincerely that the errors I have ventured to describe, and which at this present separate health from education, will in due time be recognised and removed.

In a leading article last year, in one of our powerful and widely-read newspapers, on a lecture of mine delivered in this place, there was an expression of regret that I, as a man of science, should deal so earnestly with subjects so trivial as these. Suppose the subjects to be trivial, and then in answer I might fairly quote, 'there are mites in science as well as in charity, and the ultimate results of each are often alike important and beneficial.' But I deny the triviality. I ask, if these subjects, which refer to the very life-blood of the nation, be trivial, what are the solemn subjects, and who are dealing with them?

I read in another and scientific paper, that to state facts of a similar order to those I have now related, to a public as distinct from a strictly professional audience, is a sure means by which to hurt tender susceptibilities, and of a certainty to give to some a cause of offence. To that criticism I reply, as I conclude, in the words of plain-speaking Jerome: 'If an offence come out of truth, better is it the offence come than the truth be concealed.'

V.

VITALITY, INDIVIDUAL AND NATIONAL.

IN the present dearth of political spirit and adventure in home and social topics, it may be worth an hour of our time to consider a subject which will one day absorb all others: the mode of cultivating the people who make up a nation in such a manner as to ensure for them the highest attainable vital capacity and endurance.

Hitherto, this great subject has belonged almost exclusively as a study to the physician, who has, naturally, only surveyed it from his professional, and therefore limited, point of view. He is obliged to see, in the course of his experience, different men, and different races of men, coming before him bearing certain physical or mental deficiencies which he is expected to relieve or remove. Under observation forced on him in this way, he soon learns that the vital capacity of persons of the most powerful organisation is often much smaller than that of persons of

feebler and less striking development ; and if he ventures to apply his learning so as to make it extend from details to principles, he sees a national question arising out of what was at first to him a question purely professional. He detects that there might, in the course of history, be a subjugation of a race of powerful physical build, by a race physically weaker in build but stronger in endurance, because endowed with a capacity for life more determinate and excellent.

Thus the physician becomes, unconsciously, a politician, studying the very basis of national character, power and existence.

It will be my object in the present essay to treat upon some of the facts which have been elicited by this study of a part of the natural history of man. I shall as briefly as possible try to notice :—

1. The physiological meaning of vitality.
2. Individual and collective vitalities.
3. Vitality in relation to race.
4. Influences modifying vitality.

THE MEANING OF THE TERM VITALITY.

Vitality extends to men as light extends from one torch to another ; but in itself it is individual, and the excellence of it or the worthlessness of it rests on the care by which it is maintained in the individual person. Thus the vitality of the future rests largely

on that of the present, and we who now exist are moulding the vitalities of those who are to follow us. Every step of our physiological research of late years has led to this inference. The very endurance of vital action in one organic form against time is determined more largely by the preparation for it in pre-existing organic forms than upon any other condition, not excluding the physical safeties with which those who die many times before their deaths so carefully surround themselves.

The simplest question, the first natural question respecting this vitality, is the deepest and the last to be reached. It is : What is vitality ? Is the whole universe filled with it as it is with light, and does it enter certain properly constructed organised forms as light enters the eye ? If so, perchance the construction, or the mode of that organic mechanism, might one day be discovered. Time was when the eye was an unknown structure as a mechanism, and when he had been an adventurous man who had dared to say it would be imitated in all its parts by human arts ; that glass should represent its lenses, perforated wood its curtains, and paper its screens. Yet the camera, in a rudely perfect sense, is an eye, condensing light in the same way ; seizing external nature in the same manner ; transferring the picture seized to the screen, in like fashion.

Vitality may indeed be like light. There may be in, or through infinite space, an ether which pervades matter fitted to receive it, and which, put in motion, is the fountain of life. From this view none need shrink. It is the most orthodox of all views. It is the theory of the breath of life that was breathed into man when he became a living soul.

Vitality may be an emanation from the living thing. Suppose it be so. Yet it pre-existed. It entered condensed and concealed to go forth. The light from the taper is not in the taper, in the ordinary understanding of the term, but the force which sets in motion the light is there. We may swallow the vitality concealed in food. We may breathe it with the air.

The most probable view is, that we actually feed on the vital force that endows us with mere motion, breathe it in an atmosphere in which the force once set in motion can continue to be set free. That we are in fact subdued fires, burning passively in that invisible envelope which itself will not burn, but will let us burn within it.

But this mere physical element of vitality does not prompt us to motion. As the steam-engine is motionless till the hand of the engineer outside the mechanism sets the motion free and in order, according to the build of the machine ; so we, while our

purely physical organism is in motion, are moved by some influences or impressions from without, which pass through our senses, which traverse our nervous cords when they permit it, and which are ever in manifold activity whether we are present or not to be influenced: which existed before we were, and exist after we are dead.

If this be the true reading,—and it is the reading which many years of special study of the phenomena has impressed most seriously on me,—then vitality is, from even a physical point of view, a compound of two processes; a mechanical and,—there is no better word,—a spiritual. The mechanical part, perfect when it is natural, but destructible and destined to run only a given course limited by time: the spiritual indestructible, moulding the physical to its uses, and, to our present senses incorporeal: acting sometimes by one wave or impulse through masses of living beings: acting always in some measure through masses, in so far as the general outline of the living things permit; but acting also individually, through and by reason of the physical peculiarities of the individual.

What, then, we should abstractedly call vitality is universal, and in persistent operation in inanimate matter, constituted to be animated. What we call life is the manifestation of this persistent and all-

pervading principle of Nature in properly organised substance. What we call death, or devitalisation, is the reduction of matter to the sway of other forces, which do not destroy it, but which change its mode of motion from the concrete to the diffuse, and, after a time, render it altogether incapable of manifesting vital action until it be recast in the vital mould.

We are at this moment ignorant of the time when vitality ceases to act on matter that has been vitalised. Presuming that an organism can be arrested in its living in such manner that its parts shall not be injured to the extent of actual destruction of tissue, or to change of organic form, the vital wave seems ever ready to pour into the body again so soon as the conditions for its action are re-established. Thus, in some of my experiments for suspending the conditions essential for the visible manifestations of life in cold-blooded animals, I have succeeded in re-establishing the condition under which the vital vibrations will influence, after a lapse not of hours, but even of days ; and for my part I know no limitation to such re-manifestation, except from the simple ignorance of us who inquire into the subject.

The double nature of the living organism, the existence of spirit and matter in combined action as the source of life, is by far, as I think, the best, as it is the most ancient and universal, theory. To treat

of life on what are called pure materialistic views is to leave science in as helpless a state as any other part of human knowledge. What is spirit, what is matter, we know not ; where the one extends or the other, and to what infinities, we have poor conception. We know them only by their reactions, the one on the other. We could not know one without the other. Whether they be ultimately one or always distinct, we may never understand. They are derived from the one source, and in the order of Nature are equally wonderful even as we, in our present state, are able to understand them.

INDIVIDUAL AND COLLECTIVE VITALITY.

Whatever thing is before us moving of its own instance, from an amœba to a man, is an organic body charged for a time with vitality. It is charged only for a time : that we all know, and I need not dwell on the fact. But I must dwell on some other points which have a direct bearing on the subject before us.

First, I would indicate that in all races, races of animals or races of men, there is, in the given course of time for the development of the vitality through the organic form, a steady series of similar phenomena. These phenomena extend from the beginning of the vital organic motion to its close in perfect order, when they are allowed their natural course. The vitality

begins to act and ceases to act with equal imperception to him in whom it is manifested.

The natural course of vitality in different classes of living things—of animals as well as men—is probably absolute when it is perfectly natural. It may undergo changes in course of ages, but these are too imperceptible to affect us in our appreciation of ruling law.

In man the order of vitality, the course in each individual, seems to be fairly divisible into four stages :—

1. Birth to adolescence.
2. Adolescence to maturity.
3. Maturity to decline.
4. Decline to death.

At this period of human existence the time for these stages, when they are naturally cast, runs, as I think, as follows :—

First stage. From birth to 23 years.

Second stage. From 23 to 45 years.

Third stage. From 45 to 67 years.

Fourth stage. From 67 to 90 years.

Dr. Farr has placed the possible duration of human life at a higher figure than I have given in the above estimates. He has expressed the idea that

a hundred years may one day be the natural extreme of human life.

Whatever the increased extension may become, it will be meted out in the third and the last terms of life: I mean in the period beyond that when the body has reached its maturity. The laws of adolescence and maturity are, it would appear, carried out on a definite physiological plan; but when they are passed there may be extension of life during the time previous to decline, and during the period of decline.

As a rule the extension will, I think, occur in the period of decline. At that period the natural feebleness which is felt to be approaching leads to greater care in protecting the body from the vicissitudes of heat or cold. By this care, which is thus as it were instinctively felt as a necessity, it is astonishing how long life may be preserved, even in comfort, when the care can be bestowed. Lord Bacon said that old men are like ruined towers, conveying that although old men may look hale and hearty, they are apt suddenly to fall. This also is true, and yet it is strange how long the ruined towers will often stand.

The extension of life in the periods after maturity is variable in different classes of animals. In cold-blooded animals the duration is great, and in some, as for example in the turtle and the pike, extremely great. The duration is, however, not confined to cold

bloods ; it is met with in birds, which have a higher temperature than any other of the vertebrated classes of animals, from eight to nine degrees higher than the temperature of man. The parrot is a marked instance, in birds, of an animal that may live to a very great age. I have seen one which lived over a century.

In domestic warm-blooded animals, like the horse and the dog, the variations in duration of life arise, as a rule, from work or deficient provisional care.

In man the variation is most extreme : from one-third of the natural period to half, to two-thirds to the full term, and this in our country amongst great masses of the population.

The difference is governed largely by heredity. As a rule, the individual life may be fairly estimated from the mean of the parental life. Thus, if the one parent die at seventy and the other at ninety, the life of the offspring, other things being equal, will be eighty years, if nothing in way of accident occur to check the natural course. If both parents live far and equally into the fourth term, the probability is that the offspring may live still longer. On the other hand, if both parents die early in the second term, the probability is that the life of the offspring will be shorter than that of the parents.

These facts in relation to heredity have led to the

common belief that marriages of consanguinity are unfavourable to length of life.

This is very true and very false. Marriages of healthy stocks in close relationships yield the best lives, while marriages of unhealthy stocks in close relationship yield the worst of lives.

I have knowledge of one village in this country in which marriages of consanguinity may be said to be the universal rule. In that village the people are amongst the healthiest of the community. I could trace amongst them no evidence of any serious constitutional disease, nor of deformity of body.

I have observed the same freedom from disease in families in which intermarriage is the rule; the stocks being healthy. On the other hand, I have known a whole family, and a large family, die clean out by intermarriage, the parental stocks on both sides being afflicted hereditarily with constitutional disease.

A curious question is sometimes raised as to the reason why there should be hereditary wealth of individual life? It may be laid down as a general rule, that certain external conditions of life tend to level the duration of all lives. Still some persons escape conditions which others do not escape. Why? To this question I can see but one answer, but it is an answer which is every day yielded by experience and observation. It is, that those who escape longest the free-

dom of external conditions telling against life, possess an equal balance of good working organs of the body, not one of which is specially inclined to take on any form of disease of a particular kind, such as tubercle or cancer. The whole body, therefore, continues to work, in all its parts, in harmonious order of function, and, by the steadiness of functional work, the continuous life is maintained. Life, in short, is maintained by equality of perfection in every organ.

And this is what is really meant by a good constitution, whenever that term is correctly applied. The frame of the body which offers this goodness of constitution may be small; strangely enough, it may even be indifferently developed and yet, by evenly distributed soundness of organic parts, it may continue in action longer than a larger and more finely developed frame which, pierced in one vital organ by disease, succumbs beneath a single organic failure.

I have indicated, a page or two past, the perfection of the term of natural human life. I have confined the term to man, as the organic life in which we are specially interested, and I have assigned ninety years, barring accidents, as the natural term of the action of vitality on the vitalised organised matter out of which the body of man is constructed. In this estimate I have narrowed the time to its lowest natural dimensions. Beyond the natural accidents so extreme and occa-

sional to which I have drawn attention, there is no inevitable reason which the physiologist can detect why that period at least should not be attained by the majority of mankind. Towards this the evidence of the statistician is equally authoritative. In the report on the census of this kingdom for 1871, the reporter observes that, under an ascertained law, the members of a generation fall off at the rate of mortality continually increasing, but yielding a series of lives terminating at no definite point: so that man goes through successive changes which are not completed in less than one hundred years, to which term a perfect life may, in ages to come, approximate. To these notes he adds also the following facts:—

In the population of 1871, there were 124,808 persons of the age of eighty and upwards who were born before the French Revolution: 499,779 who had passed the term of three score and ten, but had not attained to four score years: 1,050,138 men and women who were sixty and under seventy years of age: 3,973,863 who were at the judicial or intellectual age, of which fifty years, *i.e.* between forty and sixty, is the middle point: 6,841,897 who were at the athletic or beautiful age, ranging from twenty to forty years: and 10,436,229 in the ages under twenty, *viz.*, of infancy, school and apprenticeship,

the coming generation of Englishmen and Englishwomen.

The mean age of the people living, if there were no migration and the births were constant, was 32·05 years. Of the males 31·77, of the females 32·33.

The mean lifetime was 40·88 years. Of the males 39·91, of the females 41·85.

These facts show that, in spite of our bad conditions, 124,808 persons reached the close of the fourth term of life, and over one million the close of the third term.

But the facts also show that the majority of individuals did not reach the close of the second term, or half the natural period of the perfected life.

It is a very fair proceeding to extend these calculations from one nation to another. This has been admirably done, on statistical evidence, by one of my American brethren, under the title of the "Effective Population of the World," that is to say the relative rank of different countries, according to their effective populations. The abstract was first published in this country in the "Pall Mall Gazette," on September 4th, 1874, and the facts and comments are so appropriate to the present topic that I reproduce them. By effective population the author means the population between twenty and seventy years of age. "In those fifty years," he remarks, "each generation not only

provides for its own present wants and the needs of its old age, but also saves enough to maintain its children up to twenty. Of course this is not exactly true. Many are productively employed before twenty, and some continue to produce after seventy. But the exceptions are not numerous enough to disturb the comparisons; and, besides, they are almost equally frequent in all countries. Another circumstance which diminishes the value of the statistics is, that they make no allowance for the different proportions of the effective population non-productively employed in different countries. For example, they take no account of the enormous standing army of France, nor of the still more enormous pauper population of England. The figures represent, therefore, the potential rather than the actual effective populations. Understanding them so, then, it appears that in proportion France possesses the largest effective population of any country; Switzerland is next; Belgium is third; Prussia is eighth, England ninth, and Ireland last. France stands highest, no doubt, because her population is stationary; while Ireland stands lowest, because of the drain of emigration, and probably, too, of the early marriages and large families common there. The proportion of the effective class in France exceeds that in Ireland by 35 per cent., and even in England the proportion is higher than in

Ireland by 12·9 per cent. ; while the effect of immigration is shown in the United States by the fact that the proportion in Massachusetts exceeds that of the whites in the Carolinas and in Georgia by 38 per cent. ; that is, by more than the excess of France over Ireland. Comparing the sustaining power with the burden laid upon it, the demand was 94 per cent. greater in Ireland than in France. On the whites, the demand was in the Carolinas 50 per cent., and in Georgia 60 per cent. greater than on the people of Massachusetts."

More interesting and more practically instructive is a second series of facts, which exhibits the relative vitality of different populations. Judged by this test, France falls from the first place, which we have just now seen her occupy, to the second lowest, while England rises from the ninth to the third. The United States also rise, coming, so far as men are concerned, next after England. But Ireland still remains at the bottom of the list.

Out of 10,000 children born in Norway as many as 7,415, or, roughly speaking, 3 out of every 4, live to be twenty years of age. In England only 6,627 so live, or 788 fewer than in Norway. In the United States, boys have nearly as good a chance of life as in England, while girls have not ; but in France only 5,022 or scarcely more than 1 out of 2, reach twenty ;

while in Ireland, no more than 4,855, or actually less than 1 out of 2, attain that age. More surprising still are the statistics regarding old age. Out of the same 10,000, for example, we learn that in Norway 3,487, more than 1 out of 3, reach seventy; in England almost 1 out of 4; in the United States, in men only, 1 out of 4, a trifle higher than England; in France, 1,776, or about 1 out of $8\frac{1}{2}$; and in Ireland only 861, or 1 out of $11\frac{1}{2}$. If these figures are to be depended upon, we learn that out of all countries in the world Norway offers the new-born child the best chance of long life, Ireland offers the worst, while France, universally admitted to be, so far as soil and climate are concerned, one of the most favoured regions of the earth, offers but little better chance than Ireland. As regards Ireland, it is obvious that the statistics, if collected since the famine, are totally misleading. In the first place, the mortality which attended the famine, and the pestilence which followed it, was altogether abnormal; and, in the second place, there must have emigrated from Ireland, since the beginning of the famine in the winter of 1845, at least 3,000,000 people. If, then, we would know the real mortality of the Irish, we must not confine our researches to Ireland, but must follow the emigrants to Great Britain, the United States, and the British Colonies. None of these remarks, however,

apply to France; and the bad chance of life which she offers is certainly most surprising. But, in whatever way accounted for, the cost of these unproductive lives to the countries upon which it has fallen is the same.

“In the production of dead machinery,” the author adds, “the cost of all that is broken in the making is charged to the cost of that which is completed. Thus, if two things fail when half-finished for every one that is completed, the cost of the finished one is doubled; and this increase of cost is in proportion to the expenditure which has been made or lost on those that broke down in the process. So, in estimating the cost of raising children to manhood, it is necessary to include the number of years that have been lived by those that fall by the way, with the years of those that pass successfully through the period of development. . . . The loss in Ireland was 120 per cent. greater in the first year, 75 per cent. in the first four years, and 120 per cent. greater in the period of growth, than in Norway.”

These passages are quoted at length, as setting forth in a new light the pecuniary value of sanitary precautions and their results in an improvement of the public health.

One other important point illustrated by these statistics, is the relative length of life of the portion of

the population over twenty, in the different countries which afford data for making the calculation. In this respect, again, Norway stands first; Sweden ranking second. The United States, still only in respect to men, now takes the third place, Hanover the fourth, while England is only fifth. And France and Ireland are once more at the bottom of the list, Ireland being lowest.

The average length of life of the effective population in Norway is 39·61 years; in England, 35·55; in France, 32·84; and in Ireland, only 28·88 years. Thus it will be seen that, while in Norway the proportion of the population that reaches twenty survives nearly forty years, or four-fifths of the effective period, to contribute to the wealth of the community, in Ireland the same proportion survives less than twenty-nine years, or considerably under three-fifths of the effective period. The Irish effective population has, therefore, eleven years less than the Norwegian in which to replace the cost of its own maintenance and accumulate a capital for its successors.

The last point illustrated by these curious statistics is 'the cost, in years, of creating and maturing human power, and the return which it makes in labour in compensation.' This is done by showing the number of labouring and productive years secured in each country for every 1,000 years expended in the

developing period upon all who are born, whether they die prematurely or live to old age. It appears that in Norway, 1,881 years are secured; in England, 1,688; in France, 1,398; and in Ireland, only 1,148. These results are arrived at from life tables, but the dates of the tables are given only in the cases of France and Ireland. As regards France, the date is 1806; and as this was the very middle of the great war she was waging against all Europe, and as, besides, nearly three-quarters of a century have since elapsed, it can hardly be but that the chances of life have since greatly improved. On the other hand, the Irish date is 1841,—that is, before the famine,—and consequently the previous objections do not apply to the present calculations. It will be seen that Norway still heads the list. In Norway, a larger proportion of infants survive than in any other country, and when grown up these infants display the greatest power of endurance that statistics acquaint us with. A thousand years spent in the growing period, produce 63 per cent. more of working life among the Norwegians than among the Irish, and 13 per cent. more than among American men; while the same expenditure among American men produces a return of 44 per cent. higher than in Ireland. But it will be noticed that, in the case of the United States throughout, only men are referred to, while in every other

case both sexes are included, mortality in America being higher among women than men."

VITALITY AND RACE.

All the facts I have so far detailed show clearly that even amongst the most civilised nations the vitality presented is far below that which belongs rightfully to man, if the natural processes of vitality were faithfully conserved. At the same time it is probable that at no period in the history of man on this globe have the conditions for a prolonged vitality been more perfect. By comparison, much of the hardships that belonged to more primitive times has disappeared, and still, with all the advances and advantages of civilised life, the vitality of the population lies between half and two-thirds lower than it need to be.

We ask, as we study this question, is the cause of this low vitality peculiar to man, or to manner and custom? Is there in some men, is there in some races, an inherent vitality more marked and endurable in action than in others? If there be, there lies behind another question; is this favoured condition connected with any particular configuration or constitution of body, individual or racial? The answer to these questions is essential to our national knowledge. I regret however to say, that up to this time it has

been so entirely neglected, both by the politician and the historian, but few data are before us upon which to base any great conclusion. We physicians know that there exist in families certain hereditary peculiarities which tend to length of life in the individuals of that family ; but if we are brought to book, and are asked what is the nature of those peculiarities, we are plunged merely into speculation, and are obliged to admit the fact without any distinctive attempt to explain it. The most we know is of a negative order. We see that persons long-lived, and who represent long-lived families, are less disposed than others to certain fatal diseases ; such, for instance, as consumption and cancer. My impression once was that this explanation was the key to the phenomenon. Further experience and reflection has, however, assured me that the explanation is not so easy. I have of late years carefully noticed the relationship of family longevity, by what may be called family individuality ; and the fact I have arrived at is, that though individual vitality may run through a line of persons connected by blood relationship, it is not universal in that series, but belongs only to particular members of it, who, by their own personal care or good fortune, conserve the vital endowment that has descended to them. What is more, I have observed that the prolonged vitality shown by individuals is

not necessarily connected with any great beauty of form or muscular power, or even power of physical endurance. It is connected rather with facility of constitution to take rest, to accept anxiety with serenity, annoyance without passion, and success or pleasure without excitement or overweening gratification.

These individual experiences are, I must admit, too limited to be of themselves of great value. If we could trace the lives and histories of the 124,808 persons who, in 1871, were living in this kingdom at ages ranging from eighty upwards, we might truly arrive at some satisfactory solution of the vital question, why they should have reached a term of life more than twice longer than the majority of their fellow men.

When we turn from individuals to races, the question of vitality is placed on a more magnificent, yet hardly less difficult, position for contemplation. So far in our scientific history the work of the statistician has been limited to the study of very few races. Of the five great races, the white, including all the Aryan and Caucasian; the yellow, with its hyperborean, Mongolian and Sinaic branches; the brown, including the Ethiopian, Hindoo and Malay branches; the northern and southern red races, and the eastern and western black races; of all these our knowledge is

actually confined to those families of the Caucasian race which are included under the Teutonic, the Latin and the Semitic families ; and that knowledge also is necessarily limited in its extent.

We have, nevertheless, for our instruction one series of remarkable researches collected from the official statistics of different countries, which bear on the subject of the vitality of that part of the Semitic race known as the Jewish, and which compares that family vitality with the vitalities of the Teutonic and Celtic families amongst which it is cast. As far as I am aware, this research stands alone. It is the labour of M. Legoyt. In this country it may be said to have been, until recently, unknown.

I have, at great length, on two other occasions, described the facts in detail respecting the vitality of the Jewish people, as they have been recorded by Legoyt, Meyer, and Neufville : but an abstract of them may well be repeated in this place. Legoyt explains that in Germany there is 1 Jew to every 105 of the population ; in England, 1 to 446 ; in Austria, 1 to 33 ; in Belgium, 1 to 333 ; in France, 1 to 468 ; in Holland, 1 to 52 ; in Ireland, 1 to 17,910 ; in Italy, 1 to 412 ; in Poland, 1 to 7 ; in Russia, 1 to 42 ; in Scandinavia, 1 to 664 ; in Switzerland, 1 to 593 ; and in Turkey, 1 to 61. The statistics further show that the Jews in Prussia increase at a greater rate than the

general population, especially in the excess of births over deaths. If the race has fewer adults, it has more aged people. The return of the two sexes was 103·37 Jewish women to 100 men, instead of 100·72 women to 100 men in the general population. The Israelites marry less frequently, and have fewer children; but they have fewer children stillborn, and fewer deaths among those they rear. In the average duration of life among the stationary groups of men, there is a difference, to the profit of the Israelites, to the extent of five years. The Civil State extracts in Prussia only impute to them 1·61 deaths in 100, whilst for the whole of the kingdom the mortuary assessment is 2·62 in the 100. M. Legoyt attributes these advantages on the part of the Jews to their persecutions, which have made them more careful of home life and more solicitous of their poor, and to their alimentary prohibitions which are conducive to hygiene. I believe myself that by their exclusion the Jews have hitherto escaped, to a considerable extent, from some of the more fatal hereditary afflictions of others of the European societies. In one of the public institutions in the eastern part of London, to which I was for many years physician, and in which large numbers of poor sought assistance for that all but incurable malady, consumption, I computed from three hundred patients the racial characteristics. They were divided into

four classes :—those who by race and name were distinctly Saxon ; those who were of mixed race, or whose race could not be determined ; those who were distinctly Celtic ; and those who were distinctly Jewish. The results were that of the 300 persons, 133 were Saxon ; 118 were of mixed or undetermined race, 31 were Celtic, and 18 were Jewish. In the relative proportions of the respective populations the majority of sufferers was large on the Saxon side.

The above facts collected on the continent of Europe have received some confirmation here from my own researches. Dr. Asher, the Secretary to the Grand Synagogue, was good enough to give me copies of the returns of the Jews buried in London for three years, the whole number of deaths amounting to 2,563, and from these returns I was able to form a fairly correct estimate of the relative vitality of the Jewish as compared with the general population. The returns showed that in children under five years the mortality of Jewish children was as forty-four to forty-five of the general population ; in persons from thirty-five to forty-five as five to eight ; while amongst old people, at eighty-five and upwards, 2 Jews died to 0·8 of the whole population ; showing that amongst this strongly vitalised people nearly three of them passed four score and five years of life to one of

those amongst whom they were cast to live as fellow-citizens.

These, as facts of the present time, are remarkable, and are the more deserving of regard because it is probable they are not destined to last. For now the Jew, with his perfect liberty and vastly increasing wealth, is plunging into the sea of luxury, which has been so fatal to his hitherto Saxon and Celtic oppressors, with the most conspicuous blindness and haste; so that ere long, if he continues his course, he too will bury his vital capital in the mire of his material wealth. It has not been from any peculiar character of physique that the Jew has been able to live and to exhibit such tenacity of life; but it is mainly, though the statement may seem a paradox, from the very necessities of his persecuted career that he has retained his vital capacity. In a word, he has been forced into soberness of life. His home has been made to him, more exclusively than to freer men, the simple centre of his earthly existence. Thus he has been more temperate, more chaste, and more attached and considerate to the enfeebled, young and old, of that centre; more careful of to-morrow than his Saxon or his Celtic neighbour, and more careful of himself,—I mean of his own personal strength. To Saxon and Celtic eyes he has carried these virtues too far; but thereby he has won his way, and has become in the end powerful, because

he has conserved the force which the more boastful have expended in their passions and in their demonstrations of ruling physical prowess.

It remains to be seen whether the Jewish family, tempted now by the allurements of ambition, wealth, and power, will escape the contagion of other families of men with whom they come in conflict; or, if contracting the contagion, they will exhibit the all but impossible anomaly of a still persistent higher vitality.

INFLUENCES MODIFYING VITALITY.

Too long a chapter to be entered upon now would be demanded for the consideration of the various influences that are at work in reducing the average national vitality from the natural 90 to the unnatural limit of 40·88 years.

Briefly, I may say that these influences divide into three classes.

(a) There is a class which is largely uncontrollable; it includes the great accidents of nature, together with certain other great ordinances which are persistent in nature, and, as it would seem, are so essential to natural designs that they rank as absolute recurring phenomena.

The variations of seasons, the fluctuations of atmospheric pressure and temperature, and the variations of electrical tension, come under this head. These

affect all indiscriminately, and furnish even a calculable mortality. They are irremovable influences, from which we may protect our lives, and which in some instances, as in the case of the lightning flash, we may divert, but which must ever remain in action.

(*b*) There is a class of influences which is largely controllable, but which produces as yet also a calculable mortality. These influences are of the nature of floating poisons which pass from man to man, and even from the inferior animal to man. They are already to some extent brought under the governance of science, and I believe will be ultimately suppressed by the vigilant learning and art of a profession which will never rest until it has shielded the world from these attacks on its vitality.

(*c*) Lastly, there is a class of influences which spring from individual causes of error, and which of all others are most potent for evil. They depend on errors in the individual life which, multiplied by imitation and training, become the self-inflicted wounds of the nations. These, after all, are the chief sources of reduction of vitality to the low figure at which it stands, of the vital capacity of our most civilised communities. In their presence the art of the physician is powerless : it may help to keep the processes of life, even when fatally impaired, a little longer in motion ;

but in this minor effort it often fails, and beyond it it never passes.

Gathering the facts on this subject from my own observation and experience, I should place these influences against vitality in the following order.

Alcoholic intemperance holds, I believe, the first place in this series of fatal agencies. It kills in the present, it impairs the vital powers in the succeeding generations. I do not over-estimate the facts when I say that if such a miracle could be performed in this England of ours as a conversion to temperance, the vitality of the nation would rise one-third in its value, and this without reference to the indirect advantages that would of necessity follow. I mean in such trifling matters,—by comparison with the greater reform,—as the suppression of deeds of violence, of injuries arising from neglect of the enfeebled and of exposure to want.

Next to alcoholic intemperance, I should place as a cause of impaired vitality in our people the race for wealth,—the physical and mental strain to which the younger members of our communities are subjecting themselves that they may stand first in the ranks, and, at middle age, retire to wither rapidly in empty competency, so called. This rage, amounting to insanity, is checked by nature at every step. Her offspring are not made for this design. They are,

truly, endowed with free will to follow their own course ; but they are not constructed for the indiscriminate gratification of free will. To work moderately until the end of the cycle of life is the plan pre-arranged for us all ; the condition under which we are born, that we may live until the cycle is perfected. If we break through this condition, if we destroy one organ only of the exquisitely balanced economy through which our vital faculties are construed into life, we simply die.

Another influence at work to injure vital action lies often in a supposed attempt to improve it. I refer to the system peculiar to the Saxon populations of over-training the body to the endurance of fatigue, and the assumed development of great physical power. In this respect we carry with us still the hereditary impressions of the ages when there was no motive force save that of the animal kingdom, and of admiration for great physical attainment and capacity for mere animal feats of killing labour.

When upon such feats the uncivilised had to depend, the admiration was warranted by the necessity it represented ; for then it was a virtue even to die for necessity. Now the virtue is no more, and the admiration over-rated is altogether misconceived. There is no sign, there is no evidence anywhere that the excessive culture of physical strength has favoured

the vitality either of the individual or of the race. The evidence lies all the other way.

The effect of marriages made without reference to the constitutional condition of the married is a fruitful source of depraved vitality. As already stated, it is a mistake to suppose that the error now named is due to the mere matter of consanguinity. If the parents of a child be equally vitalised, their offspring will be like them. If one parent be of impaired life the offspring will be impaired; but it is when both parents are equally impaired that the danger to the offspring rises to its extreme degree. From such marriages spring those terribly calamitous issues in which the premature ending is as certain as is the beginning of life.

Another influence at work as an influence destructive of vitality is the force of the passions. A long chapter lies before me here if I could read it out. Suffice it now to say that the passions which most destroy, which grow by what they feed on, and in which the strongest cannot afford to indulge, are anger, hatred, grief, and fear.

It will be noticed, perhaps with surprise, that in all these influences that take from the vitality of the nation, poverty has received no notice,—neither has luxury. In fact they come last by natural order: for poverty, when it is separated from the other influences

of which I have spoken, and is confined to the mere honest existence, when it means simply frugality, tends to length of vital action: and luxury, when it is untouched by the evils I have described, and rests mainly on ease of mind and body, is no actual destroyer, though it lags behind frugality as a negative ever lags behind a positive virtue.

The nations that have been comparatively poor and contented, the nations that have been comparatively wealthy and inactive, have throughout all history shown the highest vitality. The rule descends to families, to individuals: perhaps in nature it is absolute.

The last great influence against vitality is the excessive balance of muscular or physical, as against pure and refined mental work. Mr. Brudenell Carter, in a very able lecture, has touched once on this point with singular force. I re-echo what he has said with all my heart.

The lost vitality lies in all countries with the slaving masses of the people, in whom the nervous organism on which so much depends for life is undeveloped, or is developed only to the mere extent of its automatic life. Can we wonder at this? Consider the condition of the industrial unit, and extend the unit to the mass, to the five millions of the industrial workers and to those who depend on them.

The necessity of having to work in masses, in the same building, at the same monotonous ever-repeating labour, in which the muscles are moving with automatic regularity, and the brain is left unemployed except to brood over real or imaginary injuries ; these conditions affect life to the core, and exert a fitting effect on the vital value of the working class. The agricultural labourer may work hard, may fare badly, may be housed shamefully, but he has many advantages. He is engaged out-of-doors in the fresh air ; he has all the beauties of external nature to delight and refresh him. His work is varied. There is the spring-tide season, with its sheep-washing and shearing ; the summer, with its hay-time ; the autumn, with its harvest ; the other months of ploughing and sowing, a constant roundelay of work, with varied change for the mind as well as the body. The artisan has no such pleasures of industry. He passes day by day, month by month, year by year, through the same monotonous labour, until at last his mind recognises but one scene ; his hands fall to but one automatic routine. To the end of his career he sees no change, nor chance of being made independent by his skill and his industry. He, therefore, is naturally apt to become fretful, anxious, irritable, the victim of smouldering passions, which wear out his heart, and lessen his nervous resistance to the many

external shocks to which he is daily subjected. Moreover, the limitation of his means leads to limitations in the necessary comforts of his home. He who is in these straits is rather to be pitied than blamed, if, in false measure of the deed, he seeks, ignorantly, still more sorrow in alcoholic indulgence. When we add together these difficulties of existence, the struggle against penury and actual want, the confined dwelling-room, the badly-ventilated, overstocked bedroom, the indifferent couch, the limited sleep, the ever-returning toil, and the rarity of wholesome relaxation, either of mind or body; when, I say, we contemplate these conditions, we have before us evidence of vital strain which practically is resisted longer than we could, at first sight, imagine to be compatible with human endurance.

Dr. George M. Beard, of New York, in an admirable essay on the longevity of brain-workers, thus felicitously condenses the conditions I have glanced at under this head: "Almost all muscle-workers," he says, "are born to live and die poor. To live on the slippery path that lies between extreme poverty on one side and the gulf of starvation on the other; to take continual thought of to-morrow, without any good result of such thought; to feel each anxious hour that the dreary tread-mill by which we secure the means of sustenance for a hungry

household, may, without warning, be closed by any number of forces over which one has no control; to double and triple all the horrors of want and pain by anticipation and rumination,—such is the life of the muscle-working classes of modern civilised society; and when we add to this the cankering annoyance to the workman that arises from the envying of the fortunate brain-worker who lives in ease before his eyes, we marvel not that he dies young, but rather that he lives at all.”

Compare this description and the figures of reduced vitality, which show vitality reduced to a full third of its value, with the observations of the same learned author on the longevity of brain-workers, and the contrast is profoundly instructive.

“I have ascertained,” says Dr. Beard, “the longevity of 500 of the greatest men in history. The list includes a large proportion of the most eminent names in all the departments of thought and activity.

“The average age of these was 64·20 years.”

Madden also gives a list of 240 similar illustrious hard mental workers, and calculates from them an average age of 66 years.

There is no such record to be found elsewhere, and the facts indicate more determinately than aught I know the importance of societies which encourage the extension of the domain of mind; which try to

chase away the gross beginnings of human life into the darkness of the past ; and which strive to project a future individual life for mankind that shall be worthily a longer, because it shall a purer, and, in the most honest sense of the term, a holier life.

VI.

THE WORLD OF PHYSIC.

A DECISION of the Council of the St. Andrews Medical Graduates' Association, that members should invite friends, *ladies and gentlemen*, to the Annual Address, has imposed on me a duty difficult as novel. Speaking in the name of a body of scholars in physic who are striving to hold an advanced position in their day and generation, I am excluded from dealing with any one of those refined subjects in practical medical science, which could give scope for possible display of the learning of the profession in its own particular walk, but which could not, at the same time, be made of interest to a general assembly. I have tried to meet the difficulty by selecting a subject that shall be common to all scholars and all interests; I mean, the mutual relationships of the communion of physic and the community at large;—‘*The World of Physic and the World.*’

Did you ever, Ladies and Gentlemen, let your

minds have range so as to take in, in one grasp of view, the world of physic as an isolation from other worlds of life on this planet? Have you thought of it distinctively, as you have of the nations of the earth, the languages, the races? Perchance you have not; and if you have not, then may the picture be worthy your regard, even though, with indifferent pencil, it be put before you and in bare outline.

We then, who, according to our several gifts, minister to the physical ills of mankind, form, the world over, an effective strength of probably one million of men, and, excluding the significant old ones of both sexes, say forty women. In every second of the passing time a detachment of from ten to fifteen of us is ministering to the sick. Each minute brings one of us at least in, or near, the presence of death. Each minute brings one of us, at least, in presence of the first breath of the living temple; making us the eye-witnesses of the natural fact so immortally expressed, that in the grand scheme of Creation, 'death has no sting, the grave no victory.' In the midst of these first and last phenomena of human existence, we live, conversant also at other times with endless changes of pain and pleasure, sorrow and happiness, strength and weakness, lying between the first and last.

As we are represented in English and Welsh life,

a fair representation, I think, of a general kind, there are nine of us, on the average, equipped and ready for the service of ten thousand living people, of whom four hundred and forty-four are constantly sick, and of whom two hundred and twenty-two die in the year. Each member of the world of physic has therefore an average of forty-seven claimants for his skill constantly on hand, *i.e.* nearly two every hour, on the average of time, by night and by day.

Our million, as the result of this persistency and necessity of action, knows little rest; and as men, like all things else of the earth subjected to motion, exist a longer or a shorter time according to wear and tear, so we, of all sections of the living human world who are above manual labour, and indeed of the community at large, up to fifty-five years of age, present the shortest of existences, in the forms by which, during our ephemera, we are known and recognised. At twenty-five years of age, we die at the rate of nearly five to four of the general community; at forty-five, as two to one and four-fifths; then, indeed, those who can live through so much, hold good their ground, and, at fifty-five, are a shade better off than the average, at sixty-five, a shade worse, and after that again better.

From the certain average destiny that is before our million, and from its close converse at all times

with extremes of anxiety, it might be inferred that our life is one of gloom. It is not so. As men, in the face of positive danger, become, even against their natures, brave, by a process of reasoning peculiar to the occasion, and extorted from them by virtue of necessity, so medical men, in the actual presence of the most serious evils, as evils are commonly understood, become, if the term be not a paradox, implacably resigned to anxiety, and live in it apart from it, save as all men live in it when it comes to them, or theirs, individually. This adaptation of the mind to the absolute necessity of time and circumstance is, in the case of the representatives of the world of physic, an inestimable blessing to all. The mind, too anxious about results, the hand, too tender for action, the voice, too hesitant to suggest or to command, is not the mind, the hand, the voice, to be trusted when the issues of life or of death stand in array. So our mistress Nature ordains, not by the bending of her laws to us, but by the bending of us to her laws, that we shall be, as we are, men who are common sharers with other men in joy and in sorrow. Men, who live in the presence of more sorrow than the rest of the world, but who, by hourly converse with that sorrow, are mentally lifted from it. Men, who know, scientifically, how best to remove or appease sorrow, and who are ready ever to accept this

task as a part of their daily duty, by virtue of an acquired nature which is in them, but not originally of them, and which, being acquired, facilitates the exercise of the duties by which they are made useful to the world, and to themselves as a part of the world.

The million of physic, as to its origin, is, and always has been, and probably always will be, from the class of mankind, middle in station. The rich and ennobled can never be sufficiently numerous to yield the million demanded. The poor can never find the means to educate the million. It is true that in this country a noble duke, a Duke of Richmond, once stood on the roll of the Royal College of Physicians, and it is equally true that a carpenter, John Hunter, came from the work-bench to bring the Royal College of Surgeons into fame, and himself into unspoken, because unspeakable, honour. But these are grand exceptions, almost alone even in England, elsewhere equally unknown. Here again Nature bends humanity to her law. It is essential that men whose daily duties extend alike to all, to the monarch, or president of the State, as to the lowest of the low, should be accessible to all, and by mind, by heart, by will, the helpmates of all; and our million represents, in this sense, more distinctly than any other living world, the common brotherhood of the world. To us, in our

actual vocation, in our dealing with abstract man, blood is blood, muscle is muscle, nerve is nerve, brain is brain, eye is eye, tooth is tooth, pain is pain, exhaustion is exhaustion, apart from all the other considerations by which other men, or by which we ourselves out of our special vocation, exalt or degrade the human social life. In moments of exalted ambition we may lament our lot, but we must bow to it as to the inevitable, and, in moments of solemn thought, we must accept it as blessed. So is it received, indeed, by the world. The peasant rests upon it, feeling, that in the hands of the faithful healer, he is as safe as the king. The proudest, the most absolute of rulers, a ruler of many rulers, trusting in it, begs his physician to treat the sharer of his crown even as he would treat the simplest of his subjects. While Christendom, speaking by the mouths of its holiest of the holy, loves, as if in the most carefully chosen and expressive words, to illustrate the character of its Divine Founder by his deeds as the Physician.

From the very universality of the working life of our world of physic its power is indefinite, better, perhaps, say indefinable. The power of the priest is not ours ; the power of the lawgiver is not ours ; the power of the soldier is not ours. We have never in our history, as a class, been connected with national revolutions, national conquests, national crises of any

kind, for good or for evil. Esculapius, according to the ancient way of expressing his greatness, was received into the number of the gods, simply because he cultivated the art of physic with a little more subtlety than his fellows. And William Harvey, the nearest personal friend, as the physician, of any crowned king, left no more powerful nor any lesser work than the discovery of the circulation of the blood.

And yet, negative though we appear to have been, and appear to be, we have at all times, and in all countries, exerted a veiled influence, which, like all great natural forces, has been the more potent because it has not been ostentatiously exposed to public view. When great catastrophes of disease have shaken the hearts of men, the world of physic has ever been at hand, a firm and reliable power, keen to investigate, bold to intervene, and, by natural contempt of danger, qualified to sustain hope and prevent the panic of despair. In our daily routine it is a part of our accepted duty to upraise the downcast ; while we hold up to the world, by the constant strain of our efforts and ambition to improve our science in all its parts, the indisputable proof that we are prepared, to any extent, to lessen the necessity which calls us into existence, and brings into our hands the labour on which we depend for our daily bread. Thus, the world of physic is in many ways a direct power ; a power

silent but sure ; a passive power, inoffensive yet propulsive ; acting solely by its units, yet strong because its units, a million times multiplied, have a common intention and will.

To this direct power of the world of physic, past and present, a power honestly claimed by every honest member of that world, may be added certain indirect influences which have not been without their value. Medicine has, at all times, produced men who have cultivated pure physical science with an energy and perseverance shown by no other special class of mankind. Our Kepler laid the first steps in the study of vision, and with these, the first steps in optics as a part of physical science. Our Mahow first suggested the compound character of the air, and the existence in it of a something that sustained the combustion of flame, and the combustion of the living body. Our Boerhaave excited a taste for chemistry and gave a character to that science, which since his day has never declined. Our Black determined the product of burning carbon, and showed that product as exhaled from the ordinary furnace and the living lung. Our Young propounded the now accepted theory of light as undulation. Our Hunter remodelled the study of natural history, and laid the foundation of that study of the history of nature, past and present, to which Cuvier, who in exile practised surgery, de-

voted his best life, and which the still living master, Owen, also of the same profession, has so splendidly advanced. Our Hartley expounded the fact of the communication of motion in vibrations, from the outer universe into the animal body. Our Locke made logic a true science, and gave meaning to the study of the human understanding itself. Our Erasmus Darwin wrote the earliest accurate readings of the living relationships between plants and animals, and bequeathed the study which his great descendant and namesake, who is still with us and of us, has so marvellously elaborated. Our Linnæus and De Candolle vie with each other as founders of that philosophical study and classification of plants, which our distinguished Hooker, with a zeal worthy of his masters, in this day maintains. Our Metcalfe, with labour of learning not often seen, was amongst the first who introduced the theory of the unity of force in nature. Our Haller conferred precision and breadth of expression on the literature of science ; and our Goldsmith introduced into works of fiction a purity, beauty, and chasteness which, before his time, were unknown. Our Mungo Park was the traveller who made the first decided progress in discovering the interior of Africa and the sources of the Nile ; and our noble Livingstone, completed what his less fortunate brother, at the sacrifice of his life, left unachieved.

In naming these simple matters of history, shall I say too much if I claim, that in the advance of the physical sciences, the world of physic has taken, and sustained, a pre-eminence which those who have made pure physics their sole study, have not surpassed.

If we turn from physical to social science, we find again, in the world of physic, the same pervading influence. The teaching of the deaf and dumb and blind to hold converse with their more fortunate fellows, has been the work of our zealous progressionists. The foundations of sanitary science were laid by Ramazzini, Arbuthnot, Pringle, Jenner, and their followers at home and abroad. From the galled limbs of the insane the iron fetters were boldly and for ever struck off by one of our brethren, Gardiner Hill; while, by the labours of Conolly, the humane management of the insane was not only consolidated, but the whole subject was reduced to an order, simplicity, and advancement, which contemporary narrative has still failed to reveal in all its meaning, plenitude and beneficence.

Connected with this same subject, the world of physic, in silent measure, is increasingly labouring to discover the intimate relationship of crime and disease, the end of which work must be to demonstrate to the legislator that the absolute theory of

punishment, as the one and universal remedy for crime, is equivalent to crime itself in folly and in evil; and that the major part of the miserables who occupy the felon's dock or cell are specimens of mentally deformed humanity, to save whom, or the similar of them, from disfiguring another age, we must go back to the principles of their growth, training, development, and cast improvement there.

Lastly, in its estimates of life,—of life as a something that may be calculated upon, even in the money market, insured upon and realised, as of so much gross earthly value, changing in value according to habit, condition, descent, labour, and of the comparative life values of professions and trades, of sexes, of towns, counties, nations,—our medical world has produced learning which has no rival. One man of the medical world, has, in this direction, invented a science, the ultimate value of which cannot be foreseen, it is so wonderful. You have anticipated me when I name Dr. William Farr.

The learning of the world of physic, its own learning, is, at first sight, singularly irregular and diverse. In this advanced Europe, in America, and in the other civilised nations, the physician is, one might think, another order of mortal, when compared with his brother of the far east, untutored and rudely skilled.

In this civilised land, see the learned professional what aids he calls? He enters the chemical laboratory, and brings forth potent agents with which he moves the living organism almost as he pleases, now putting it into dead slumber and perfect rest, anon increasing its muscular action till the will is made subservient to the stronger power. He subjects the body to extreme of heat ; he freezes parts of it until the structure is like stone. If he listens, he puts his ear to the body and hears its mechanical throbbings and breathings, and reduces what he hears to such perfect rule that he can calculate on changes of structure and function, as distinctly, almost, as if he could see the hidden workings. If he listens, he takes up his reflecting glass, peers straight into the eye and other parts of the organism, and observes the changes of structure and function with exactitude. If he listens, he takes out his delicate thermometer, and measuring the animal force, determines, with refined nicety, the balance of overaction or reduced action. If he listens, he counts the pulsation of the body with a stop watch, or weighs the pulse, I may say, with his sphygmographic scale, and makes it write for him its own history, black upon white, or white upon black. He takes out of the body a speck of its blood or other structure, and, with delicate lens, reads off the history of great physical changes going on in the whole or part of the body, and, it may be,

forecasts results with true discernment. In short, he gathers such absolute information respecting the body and its conditions, that if he were master to rule, as he is to observe, its phenomena, he were master of all that man could achieve in physic, and would be already that perfect animal engineer he one day must become.

In uncivilised, or partly civilised, Thibet, see, on the other hand, the so-styled learned physician, and the aids he calls. In the month of September, when the day breaks over his magnificent mountains, watch this man leaving his Lamasery to collect his remedies. A leathern bag and a tea-kettle carry all his wants. Armed with a pointed iron-capped staff and hook, like a Druid of our own old time, he marches forth with his train of pupils, and roaming the mountains, picks out of the laboratory of Nature his medicinal stores, from branch, from shrub, from root. With the declining sun he returns, laden with his spoils, next day culls them, dries them in the air, packs them, labels them, stores them in some safe garner of the quiet Lamasery, and, in his honest soul, believes that the wealth of the whole medical world is in his safe-keeping. Called to the couch of the sick or the dying, he is content to hear of pain, to read off signs of oppression, and, striking his fingers across the pulse of each wrist, as a musician doth the strings of his

instrument, he is satisfied. The phenomena he sees are with him easily understood ; they are the assaults of a demon who must be expelled. So many diseases, so many demons, and, let it not be doubted, so many remedies. From the wonderful pouch by the side of that physician, come forth those dried plants he gathered on the mountain side, and down the throat of the afflicted certain of them go, in nauseous powder. Or, should the remedy not be in the pouch, this wonderful Lama physician, with more than homœopathic skill, writes the name of the remedy on a scrap of paper, moistens the paper with his lips, rolls it into a pill, and administers it to the faithful, who, straightway swallowing, with the earnest belief that the name is as good as the thing when it comes through proper hands, believes and lives, or believes and dies, as the case may be.

But before the last event shall happen, be the patient rich enough to bear the operation, our good Lama has one or two other resources at hand, belonging to the imaginative, which resources are bold, and, in proportion as they are bold, effective. By that most convenient of theories, that every disease is a demon within the man, the good Lama has a power to which we civilised have no claim. Between the actual existence of a thing, and firm faith in that existence, whether it be or not, the gulf is narrow in

all minds, absent in most ; and so, the Tartar patient is, to his physician, as good as a man who should have veritably of veritably a demon within him. Well, I put to you here, to all, what would you wish for most if you believed as firmly that you had a demon in your tooth, making it ache, as that you had a tooth to be made to ache? I suspect you would like to have that demon cleared out. Further, if you were a Lama physician, and knew the quality of the demon, and his best mode of exit, you would, I think, attempt to remove him. Our Lama sympathises. He says to his patient, ' I can get rid of this demon by certain magical prayers, but you, being a wealthy man, are afflicted with a very proud demon, in fact, quite a swell demon, and he will not go away unless you find him a thorough good horse to carry him off.' And so the horse is brought out, properly accoutred, the prayers are recited, and then, the demon getting inside the horse, and the physician outside, they go away together, and unless the demon leaves the horse, or the physician disposes of both, demon and physician remain as intimate as is proper so long as the horse lives. Where the demon goes afterwards I cannot say ; I suppose to his native place.

In our world of physic, the Lama and the civilised physician are at the antipodes of science, for which

reason I have put them in contrast, leaving you to fill up the intervening castes if you like the labour.¹

The diversities of the learning of the world of physic, great as they are on many subjects, do not separate it as a body. Skilled or rude, its representatives, by virtue of their daily work, have many qualities, and ripened faculties, in common. Brought into close converse and intimate communion with living humanity at the times when it is feeblest and most distressed, the physician sees, as in a mirror, the back as well as the front of human nature, and, instinctively, recognises its shape and character with an imposed accuracy of observation, to himself often extremely painful. The inner life, the relation of the soul to the body : the vehement will, built on the powerful heart : the vehement will, succumbing under the breakdown of the heart once powerful : the brain, nobly balanced in structure and in function : the brain unbalanced : the criminal, by nature criminal, strong in untruth, vaulting even into temptation, proud of his own selfishness, dishonest by intent : the virtuous, by nature virtuous, born virtuous, constructed on physical mould of virtue, steadfast in all trials, generous in all conflicts, patient in all afflictions, truthful in all tempta-

¹ See, in relation to this description of the Lama Physician, the fascinating book, *Travels in Tartary, Thibet, and China*, by M. Huc, translated by W. Hazlitt.

tions, honest in all emergencies : the body and soul together balanced, well or ill : the body exceeding the soul, the soul exceeding the body. All these conditions come before the physician, and, *nolens volens*, must be read.

The world at large, busied with other concerns, and not understanding this forced study of the world of medicine, often criticises medical men for giving opinions respecting the mental conditions, particularly of criminals, contrary to the opinions which revenge, unmoderated by knowledge, insensibly inspires. I picture before me a powerful man, for years the esteemed of the most estimable. What of him? His abashed friends tell me he has sinned. I see him, and his broken intermitting useless heart proclaims to me an irresponsible being clothed still in all the apparent majesty of reason. I know his brain is like a flickering gas-light when the pressure is unequal at the main. Conscious of his own helplessness, uncertain, shrinking from himself and the world, what wonder that the man, in brief time, should be discovered a suicide? I wonder not. Still, for me to say that that man was irresponsible were to subject myself to the ridicule of the majority of mankind.

I have put a common experience, and because it is necessary, I have tried to put it forcibly from nature. All the judges on the bench could not, by all the

legal knowledge in every book of law; understand correctly a case of this kind. That man, brought when he sinned, before a judge, would probably have received a moral discourse on the iniquity of crime, as well as sentence to punishment for offence against the State. Learned judge, exalted above thy fellows, and mostly wise, but now mocking a law above thine own, thou wert as well occupied in lecturing a rabid dog on the sin of biting, or in punishing a cobra di capello for the crime of carrying deadly poison!

It is the forced reading of the inner life, of the mutual dependencies of the soul and body, of the phenomena of outward action in man as dependent on inward function, and of formed character, as based on organic construction, that makes medical men appear to the world so special in their views in favour of mercy and against extreme of punishment. On these points, the members of the profession are not weaker, nor better, nor more generous than the rest of the world. They are, simply, better informed; a good century in advance of the world at the present rate of education; so advanced, indeed, that it is hardly possible to announce what they know, lest it seem extravagant and dangerous. But their knowledge charges them, irresistibly, with mercy. As they cannot, if they would, be angry with a man whose muscles are paralysed, because he declines to take up

his bed and walk ; neither can they be vindictive in regard to a man whose brain, physically unbalanced, is led to do that which, by the abstract standard of right and wrong, *is* wrong. We take a pigeon : we freeze a segment of its brain, and straightway, from destruction of balance of power, the creature begins to walk backwards, turn summersaults, and do other strange things. Shall we be angry with the bird because it presents phenomena which are not, according to our views, natural ? In brief, the world of medicine sees the phenomena of human action, in form and character, even as it sees the human body, itself a mere phenomenon. It beholds the mental form every day, as though in a stereoscope, solid, defined : it may have aversions to what it sees, or likings ; but it cannot, in face of reason, anathematise or praise, as if the objects seen were deformed or beautiful according to their own sovereignty over themselves.

These views lead the world, in general, to recognise what it calls the active sympathy and benevolence of the world medical. The truth spoken, this is an error. Medical men are neither more sympathetic, nor more benevolent, than the rest of mankind : the qualities, so recognised, are the results of a better knowledge of the strength and weakness of the animal organism, and of the dependence of mental manifestations on corporeal health.

Such, in poor sketch, is the world of medicine. A world of a million, dying earlier in life than the other millions: a million living in daily converse with pain and sorrow, yet not sorrowful: a middle-class million, stretching out its hands to work for lowliest or highest born: a million, having little direct power in the nation, yet giving birth to new action which becomes, by development, powerful, and inspires nobility of thought and life: a million, differently and diversely learned: a million, having, by necessity of daily practice, the deepest of insights into the inner life: a million, brought to the love of mercy by the bare knowledge of the weakness of mankind which calls for mercy.

THE WORLD AT LARGE AND THE WORLD OF PHYSIC.

The relationships of the world at large with the world of physic are, on the whole, good. Three things I notice specially on this head. Firstly, that in its distresses the world at large never fails to run to the world of physic. Secondly, that by its returns for services rendered the general world keeps the physic world fairly provided for. Thirdly, that although the general world does not pay to the world of physic any enthusiastic admiration, it pays, usually, sincere respect,

which is, after all, probably, the safest reward. These foundations are sound and satisfactory : but there are, nevertheless, certain differences between the two worlds, which it were well, if possible, to remove, and which it cannot but be useful candidly to consider.

The great, perhaps I should say the one, serious difference is, that the world at large holds the practical knowledge of physic to be uncertain and limited. Hence, in its dire distress, the world at large is wont to make little distinction between the most conscientious and learned of practitioners, and the meanest of pretenders in medicine : hence it supports and sustains what we call quackeries, respecting which act we, wisely or unwisely, are keenly sensitive. On both sides there is error. There is error on the part of the world at large, in that it expects more of us than, in the time allotted to human learning, we can acquire and bring into practice ; there is error in that it does not, by learning for itself something about the laws of life, become conversant with the characteristics of the conscientious physician as distinct from those of the charlatan ; and there is error in that it does not distinguish between positive knowledge and mere opinion or dogma. There is error again, on the part of the world of physic, in that it does not look firmly enough into the causes of its own weakness ; does not sufficiently

take into account the natural fears and feelings of mankind ; does not sufficiently strive to make the world partakers with it in its knowledge, in its weakness, in its power ; but rather bends to the prejudices of the world than attempts to remove them by demonstration of their mischief and of its own unwavering, however slow, progress towards what is right.

What mutual understandings, then, should subsist between the world of physic and the world ?

The man representing the world at large should, I think, first consider what, in the fullest sense, he can expect the man of physic to perform for him, and how far Nature herself ordains that the success of the man of physic shall be permitted. In this sense he, the man of the world, should make the utmost allowance for the tremendous odds which the medical man has to contend with, by reason of the inevitable law of Nature, that the continuance of life is based on the continuance of death. If we save the life of an individual never so many times, a time will come when we shall be utterly unable to save that life. So art at last must fail. Or, to proceed to more general propositions. So inexorable is Nature in maintaining the balance of life and death, that she sometimes strikes down portions of mankind wholesale, by causes which she does not give us time to study, until the

event has swept by us: she apportions mortalities to seasons, and diseases to races: she puts on earth, for her own purposes, beings so differently constituted that they defy the application of any one absolute rule of treatment: she stamps character and build by hereditary transmission, and brings us face to face with special differences which we cannot possibly control. These rules, set by Nature herself, enforce limitations on the skill of the physician which are primary, and should be at once conceded as inevitable. Physicians would be gods should they be other than they are, units of Nature, contending with Nature altogether, contending always, often losing, and never winning actually, but sometimes seeming to win when to win is in accord with the great argument of natural necessity.

The representative of the world at large should remember, again, that the man of physic, having in all cases to deal with free will in man, must needs be perpetually crossed in his finest knowledge by the fruits of free will. If we could raise the dead, there are men who, so raised, would die again as quickly as they could. We do not as yet raise the dead, but it is our constant duty to put men into such mode of life that they shall be raised from the misery of sickness into comparative health and comfort; after which we find, as constantly, they go back against

their reason to their old ways, and are the same as ever. I think I may say it for all my learned brethren, present and to come, that there is not the remotest expectation this difficulty will ever be removed: for, turning to our own selves, we find that we, by example of free will, are the most determined specimens of it. We are retail and wholesale specimens at one and the same time: by force of habit, we run into special dangers from which other men instinctively shrink; and, although we are conscious of practising a profession which will make us have the shortest life value of the community, we stick to it as if it were the elixir vitæ itself, and something more.

A man is not engaged in the practice of medicine one twelvemonth before he learns the fact of this resistance of free will. Some medical men grow hopeless thenceforth, and follow their art, feeling that, whatever they do, it is so much the same, that if they only use the knowledge they have gained it is as good as any new knowledge, and that for them to endeavour to discover new truths were indeed a task pitiably bootless. Others more enthusiastic make straight ahead, always determining to do something, in spite of the dead opposition which so constantly meets them. But even these, after the days of youthful inspiration have passed, sigh as they labour. They believed in the beauty of life, in the glory of saving life, in the

admiration of mankind for the duty. A dream! They wake to the consciousness that of all things least appreciated, life is that thing. They see riding on the heart of every adult, man or woman, the disease *atra cura*, 'black care,' worry, which sits deadly, and for which there is no physical remedy less than death. They see men, without any obvious reason, running tilt against each other, and dogging each other, and persecuting each other, all for mere dross, unless it be that collision of mind is necessary for existence of mind. They see the affections of the young wounded, and the parental soul stabbed till it is lifeless. They see men ready, at all times and ages, to sacrifice any length of life to any shortness of ambition. Now a line of youths in their prime is in view, with fathers, mothers, and hosts of friends cheering them. They are going to row a race. If that act did, of necessity, deprive those youths of half an eye, or half a nose, or even half a finger, they would not be induced to enter the lists so readily, neither would they be cheered so vociferously; but because it costs them half a life, on they go: for, what is life? Again, there is a line of older men, some very old, as we have seen recently, with boisterous friends, wives, sons, and daughters, this time cheering them on, and noisome enemies hissing in discord. These men are running to row in the boat of the

State ; they spend a year's accumulated animal force in shouting to a crowd that will not listen, but shouts again ; and they get, or get not, thê famous two letters to their names by giving up a good tenth of all that remains of their ephemera.

I refer to these things not in slight of reasonable competitive effort, physical or mental. I, who in the enthusiasm of scientific research have never hesitated to accept what the pusillanimous would call personal risk, have, least of all, a right to uphold fear of death or fear of shortening life, as a virtue. I do nothing of that sort, but look on the little general regard paid by humanity to its own individual existence as one of the most perfect of natural ordinances. I think no more noble words were ever spoken than those of brave old Sir Humfrey Gilbert : ' Give me leave therefore, without offence, always to live and die in this mind : that he is not worthy to live at all, that for fear or danger of life shunneth his country's service and his own honour, seeing that death is inevitable and the fame of virtue immortal.' I think that our professional enemy, free will, is never so useful as when it is sustaining the brave. The truth that

All men think all men mortal but themselves,

is, to me, a great truth. I see free will setting the world proudly and properly above the most skilled of

curers. I would not ask even for a miracle to save myself from death, at the loss of free will. But I point out, none the less earnestly, that the world can never have those perfect results of medical science it craves for, while a greater power than science, that which makes science, the independency of the individual mind, reigns divinely supreme.

The world at large should recall, as a guide to itself, not less than as an encouragement to scientific healers, what a vast amount of real knowledge is acquired by the physician. To master the details of structure, the anatomy of one organ of the animal body, is as great an effort as to master every detail of many occupations by which, exclusively, some men gain their bread. But the medical man, by infinite labour in a school of the most painful teaching, learns every organ of the body, and knows the body as other men know their houses or factories or machines. The number of diseases affecting humanity are over two hundred, yet are they so well understood by the medical world, that any seeming new form of disease is detected so soon as it makes itself known. The distribution of disease over the planet has been mapped out with such care that the charts of disease are as correct as are those of land and sea which the geographer supplies. So soon as the chemist makes a new discovery of element, or compound, the physician

is after it, proves it, and takes it for his use, or rejects it, according to its worth. On these matters of knowledge the true physician bases his practical skill ; sick himself, he has no other basis on which to rest. Can the world, except under force of folly and blindness, expect a better or a sounder foundation ?

Once more. The world at large should never forget that the progress towards perfection, in medical science, must of necessity be extremely slow, because of the great anxieties and risks attendant upon its cultivation and development. The chemist, who is dealing with inert matter, proceeds in his course without any feeling of responsibility in regard to the material substances in his hands ; he can play with force and matter alike, indifferently, if he but take care of himself. The mechanist and engineer are in the same fortunate position. But the representative of medicine is circumstanced altogether differently. The wonderful organism which he treats is his own, or the same as his own ; towards it he feels sympathy, fear, affection, which are returned to him. Thus, in making every advance, the labour of the physician is infinite, the responsibility of the highest order. He has, probably, to begin by testing his new thought on inferior animals ; then, perchance, in many cases, he must proceed to himself, and on his own body make his preliminary investigations ; and, when all this is

achieved, he has to accept the risk of pronouncing, and bringing into practice, that which he thinks may be done. In this stage of his proceeding his anxieties are greater than ever, for the world at large is wont to look upon him as a theorist, and to request that, however valuable his advance may be, it be not tried on it. Neither can he blame the world on this account, it is so natural, though it may stand directly in his way.

It is impossible, indeed, to describe how deep is the anxiety with which the thoughtful man moves in the progress of new inquiry in medicine. First, the mind has to give up something which it has been taught to believe and practise; next, it has to see solid grounds for disbelief, and, by a process of negation, to begin its course. Then it has to weigh every reason why it should suggest new thought in place of the old; and finally, it has to put its new reasoning into the crucible of experience, and to allow learned and unlearned alike to be judges of its value. These labours and anxieties are such, the wonder is that progress is made at the rate at which it actually travels. The majority of practitioners, burdened with the weight of many cases of disease continually on hand, have little leisure for new research, while those who have the leisure shrink, as a general rule, from investigation that lies out of the line of their direct daily pursuits. I put

it, therefore, to the members of the world at large to think generously on the advance of medicine, and to be satisfied that if the advance be slow, it is not too slow to be sure, or to deserve that confidence which they ultimately will have to repose in it as the partakers of the good it shall achieve. Moreover, and without a syllable against the conservatism men of the world exhibit when they express that they prefer to be in the hands of what they call 'the safe man,' who tries nothing new, I crave of them not to let the feeling pass into superstition and injustice.

The world at large should recognise, better than it does, the great fact that, in true scientific medicine, there is no secrecy of knowledge, and should be more cautious than it is in believing that this or that man has some special gift, or information, which less favoured brethren have not. It is quite true there are men endowed with special gifts, resulting from practice or knowledge. One man has a delicate hand and strong heart for the performance of an operation, another man has not, and so far the particular man is to be trusted and rightly preferred in his particular way. But, carried to an extreme, the fashion of the public to specialise all medical men is painfully absurd, and is opposed to the best interests of the whole human family. To assume that one physician is, what is vulgarly called, 'clever' (a term of positive

insult to a man of true science) for this malady, a second for that malady, and so on, is injurious alike to the profession and to the public. It fills the weak professional man with false pride, leading him from the contemplation of the body as a whole, and from disease as a unity presenting a variety of phenomena, to the contemplation of individual phenomena apart from unity. It impedes discovery, which must always be built on unity, because it divides thought and nourishes dogma. It ruins the public judgment, because it tempts the most insignificant mortal into the belief that, if he can only successfully inoculate the public mind with the assumption that he is specially wise on the subject of a given disorder, he can succeed on such bare and base assumption. Lastly, it prevents men of broad and expanded views from cultivating their particular talents, and enshrouds them with the fear that if they give scope and character to their life, they will be considered, however accurate their learning, however sound their judgment, as too general in their aspirations, and too indefinite in their principles.

In relation to this same subject, the world at large requires to be corrected in regard to the object it has before it, when it seeks the services of the physician or surgeon. Ninety-nine persons out of a hundred, who go to consult a medical man, never think of

asking for knowledge, but are content simply to ask for what they call '*an opinion.*' Nay, when they change from one medical man to another, they take the step again, almost invariably, not with the desire of knowing more, but of getting '*an opinion*' more. This is fatal error, leading to inconstancy, caprice, and deficient earnestness of purpose. An '*opinion*' can be given by anyone; knowledge can only be supplied by the learned. I am so poor an astronomer I doubt if I could calculate the time of an eclipse, simple as the problem is to the learned in astronomy. But, if it would soothe the feelings of anyone present to have an opinion whether the inhabitants of other planets eat and drink as we do here, I might safely undertake to give an opinion on that subject,—particularly if the usual fee were remitted,—as sound as could be given by an Adams, a Leverrier, or a Herschel.

I do not offer these remarks as against opinion, based on knowledge, but only as showing the folly, so widely prevailing, of seeking opinion irrespective of knowledge. True it is that the profession itself, to a large extent, corrects this folly, because medical men, when they meet together, go direct enough to the question, not of opinion but of knowledge, and test and try each other with a severity which those outside the pale little comprehend. It would be better for the members of the public to imitate this example; and,

in hours of trial, before they throw the handkerchief from this physician to that, to return disappointed,—as they constantly do return,—to the physician who knows them best, to consider on what grounds they make the change, why one man should know more than another, and what solid reason gossiping advisers have for upsetting the relationships that ought to exist between the sick man and his conscientious adviser. The present time is one in which these words require to be very decisively spoken. The break in the relationships I have named, is based, often, on such frivolous arguments that the faithful physician is left without heart to pursue rigorously and thoughtfully the course he sees most advantageous to his patient ; and the result is, that he loses interest in his charge, pleasure in his duty. In doubt or difficulty he has not, and cannot have, the slightest hesitation in expressing doubt or difficulty, and in saying to his patient, ‘ I, who know most correctly the capacities of my profession, the true workers in it, should like, if I were in your place, to gather the knowledge which some one of my brethren may possess.’ But to be allowed no opportunity for such suggestion, to be discarded to-day, and courted to-morrow, equally against reason, is a process morally bad. The good man palls under it, grows cynical, cold, doubtful. The shallow man alone luxuriates in it ; the people, says

he, want an opinion, and care little for knowledge; why then should I burden myself with knowledge, when opinion will pass for knowledge and wisdom both combined?

An intelligent interest on the part of the world at large, an interest which every honest physician longs to see evinced, would lead to a direct reform in the world of physic itself; it would make the profession more secure, the sick safer, the healthy happier. It would inspire that just pride in the members of the profession which is the very soul of true attainment, and would let every man feel he is esteemed for what he is, and not for what he seems to be.

It may be expected, from what I have already said, that I shall forthwith proceed to call in question the consort of the people with quacks; or pass an anathema on quacks and quackery individually and collectively. From this I abstain. Consort of the community with quacks is so obviously the result of ignorance, that, if the most moderate share of attention were given to the subject, if a tithe of the attention I have prayed on behalf of the profession itself were given by the world to the subject, communion with quacks and their foolish arts would naturally cease. As to the quacks, to notice them were to elevate them. Belonging strictly to the worst of the criminal classes, they are moved by no sentiments which the most

acute criticism could touch. A professed gambler may have sense of honour, a professed pickpocket may have skill, a professed burglar may have courage: the professed quack has the sins of them all, the saving qualities of none. He is, because he is permitted, a forced necessity of morbid minds. One thing only would I note in his history as most wonderful: namely, that the grand disseminators of human knowledge, the grand teachers of moral truths, the proprietors of the fourth estate, do often allow him unblushingly to deface their fair pages with his falsehoods, his snares, his open loathsome sins. Day by day the press, in daring faultless language and sentiment, exposes vice and purifies the thought of the world: day by day, in many of its organs, it sells itself to the advertisement of immoralities worse than the worst it endeavours to remove.

THE WORLD OF PHYSIC TO THE WORLD AT LARGE.

In asking the world at large to cultivate a more correct understanding of the world of physic, it were false to assume that the world of physic has no new obligations to perform in return, no new understandings to acquire. Quite the contrary, if it has something it ought to take, it has much also it ought to

give, and that without reserve or waiting for primary acknowledgments.

In the first place, the world of physic has arrived at a point when, without dogmatical violence, it should be ready to sustain a firm defence of all its practical part. The time has been when, in medicine universally, there was the same science as that which our still extant Lama physician, with his iron stick, leathern bag, tea-kettle, garner of vegetables, paper pills, and demoniacal horse, so proudly possesses. In simple enquiry for remedies possessing each a specific virtue, in charms or spells, our ancient fathers of now civilised medicine spent their days. Slowly they gave up the direct superstitions ; yet so slowly that, as late as the reign of the second Charles, there were some who conceived the royal touch a cure for scrofula, and when that mad monarch went about his bad business into the unknown, there were some, who, with a strong dash of superstition hanging to them, must needs cram dead bones, finely powdered, down the royal gullet into the royal stomach itself. But, in time, the direct superstitions died out, the actual remedies were left to work alone, and physicians of eminence became great in particular remedies for particular diseases. Old Dr. Radcliffe's book of receipts, what a tenacious hold it had ! and pharmacopœias sent out from headquarters, what wonderful forms they supplied ! ' Philo-

sophic oil of bricks,' imagine that for the name of a remedy ! and broth made of vipers, think of that for a speciality of curative character !

These things are swept away, and the principle of trying to discover remedies by empirical observation is on the wane. The whole field of medicine is indeed so changed, that, if a physician well informed in all modern advancements could possibly meet even such true men of the last century as Richard Mead, or John Arbuthnott, I doubt if there could be any common understanding between them, either in respect to the nature of symptoms, cause of disease, or question of treatment. Notwithstanding, there is yet great work to be done. Still influenced by the crude hypothesis of the possession of particular remedies for particular diseases, still vain of its method of learning by loose and disconnected observation, the medical mind is weak, watery even, in the knowledge of positive treatment. It flatters itself with what it calls experience, which means individual opinion as to the virtue of some particular thing, tested all on one side, without a single research in the line of disproof, and without the remotest allowance for the almost certainty of coincidence. Or, running into an extreme of disbelief, it flatters itself again on an experience in an opposite direction, experience of doubt as to the positive value of medicinal remedies altogether.

Thus it is open to any man to obtain notoriety for any remedy however absurd, and based on hypotheses however foolish, if he will swear hard enough, and loud enough, to the good results which are seen while the patient is under the remedy, and nothing more. Thus it is also open to any man to gain notoriety by, practically, giving no remedies at all, if he will only swear hard enough, and loud enough, to the good results which were observed while the patient was under no remedy, and will be silent on all else.

Let it not be concealed a moment that this state, though it mark only a transitional stage of learning, is all wrong. It makes the profession, where it should be as firm as adamant and as certain as time, loose as sand and uncertain as the wind. Thus circumstanced, the profession gives way to popular cries, and, with blushing face, bends its head, in mass, even to the ignorant fashions of the hour. For two thousand years one remedy I could name held unrivalled sway. Suddenly, by caprice of experience and fortuity, this remedy became unpopular; straightway from that side of it which was good its masters turned their ready eyes to that side of it which was evil, and lo! the remedy of two thousand years was let go in a quarter of a generation. In contrast, there springs up another remedy I could name, which for more than two thousand years had held a modest place.

Caprice and fortuity now lifted this remedy into the sunshine of favour ; straightway from that side of it which was bad its masters turn their eyes to that which was good, and lo ! the remedy is so exalted that grinning Bacchus leaves his barrel to find out Esculapius, and congratulate him on the conversion of his family to the right faith at last.

You smile ; it is a theme on which to be solemn. There can be no true, practical, safe or sound medical skill, no freedom from quackery, no mutual trust between the world of physic and the world at large, until each man of physic can conscientiously say, Whatever I believe, or teach, I know.

You ask me one fundamental question. Of two hundred and more well-marked series of phenomena known as special diseases, how many, under the proper natural conditions for recovery, would pass into recovery and health without any special remedy at all ? I am not ignorant of medicine, but I answer boldly, on that point I have no knowledge. Basic as the question is, corrective of innumerable pretences as the true answer to it would be, it has never yet been systematically studied, nor held worthy of serious regard. The mutual understanding that should subsist between the world of physic and the world at large on this point, rests for obtainment with the world of physic. It is in the interest of medicine, as it is in its

duty, to save the world the labour of the answer, and to become itself consolidated by the first possession of the truth.

To make, with rapidity and certainty, those advances which shall place the physician in the possession of the positive scientific practical knowledge which he requires, the world of physic generally is bound to look a little more keenly at the advances of pure physical science, and at the physical connections which exist between man and the natural forces which surround him, and, if I may so say, fill him. The thought that man is an isolation, common as it is, is a thought which must be sacrificed to truth. The physician who looks on a living body before him as belonging to itself, to a part of the earth, to the earth altogether, and nothing more, is no true physician. That body which he touches, moving in its undying course, belongs to the whole universe of God. It breathes, it yields a breath of matter, having substance, weight, even form! What is the destination of that invisible breath? That body speaks and sets in motion waves of infinite matter, extending in infinite space, through infinite time: not a breath, not a sound, not a motion, not a thought lost. 'Tis a sublime organism. Yet are we favoured to learn it, as we shall one day know it, as a simple organism; an organism now bending under the attraction of mother earth,

weak, exhausted: now charged with force, strong, and resisting the attraction: again, weaker and weaker, and at last so weak that it returns to the grasping mother, senseless as herself, her own. What relations of force to matter subtend in these phenomena? That is the first question for the modern physician. Drugs, instruments, old drugs, old instruments, new drugs, new instruments, they are the same, until they take their secondary place; then, in their place, they may all be good. In this, the pure physical line of advancement in medicine, there is promise untold. To follow it, it is not necessary that many men be taken from the toiling ranks. The bases lie soundly for its advance, and the revolution of thought and practice which it will bring must needs be slow, silent, and attuned to the time.

I do not stop to name minor advances of the world of physic, though many tempt me by the way, but pass, finally, to consider one which refers rather to a neglected than an unrecognised subject. I mean the careful study of moral and mental curative measures as supplementary and conclusive to those which are purely physical. The most scientific physicians have, I think, fallen into the error of studying, with too exclusive a care, the observable conditions of the body, healthy or diseased, and those agents or agencies for curing diseases which produce the most

obvious effects,—such as knives and other instruments, anæsthetic vapours, active drugs, heat and cold, electrical shocks, and the like. I take it truly that these are naturally first studies. It is fair to infer, from the general plan of creation, that the simplest organism is the primitive, and that the pure physical existence is the groundwork and the primary necessity of the highest form of living thinking thing. But granting this, we, men and women,—highest forms on this earth at all events,—are, as Plato magnificently teaches, “plants not of earth but of heaven, and from the same source whence the soul first arose, a divine nature, raising aloft our head and root, directs our whole corporeal frame.” While, therefore, it is by nature the first duty of the healer to make the corporeal frame pure and whole, is it not equally his duty to study what shall enter by the senses or windows of the mind, and, though invisibly entering, be potent forces for evil or for good? Because an agency is not visible, not tangible, is it less real? If a man lose his mind by the failure of his blood, that, it is said, is plain to understand, for it is physical. But, if some horror come upon the man through his mind, so that, like poor Horatio, he is bechilled

Almost to jelly by the act of fear,
Stands dumb and speaks not;

is not that, too, physical ; an action direct of mind on

matter, reversing the physics of the body and creating disease? It must be so, and in the study of this action from the universe into the man there lies a world unknown. With strange acuteness, charlatans of all kinds have touched, without understanding, this unknown world. They have played, it is said, on the credulity of man; they have done more, they have, in ignorance of what they were doing, touched the animal motion through the direct entrances by which the universal spirit also enters. The need for new contemplation here increases with the intellectual development of the race. The cave-dweller is gone. The Norseman is gone. The crusader is gone. The animal body, living with powers superior to the soul within it, must also, in the course of the suns, altogether pass away, to be replaced by an organism more finely moulded, more accessible to the external beauty and harmony, more sensitive of pain, more sensible of weakness, less susceptible of maladies evidenced through matter, more susceptible of maladies evidenced through mind, and more impressionable to cure or to injury, through the mind, than through the baser body. To study these changes of existence and action; to open this unknown world of natural truth; not to trade upon the knowledge of its existence, but to comprehend it with the grasp of a philosopher, is a duty to which the man of physic must devote

himself with zeal, or recede with humiliation from one of the highest seats in philosophy.

Our million of physic, scattered over every part of the planet where there is enfeebled humanity to be tended, cherished, and upheld, by night and by day, it, and its relations to the world, its good, its bad, its hopes, its despairs, we can on this occasion follow no longer. I have tried to present it faithfully. I have tried to show its strength; I have not tried to conceal its weakness. Called forth by the world itself from dire distress, a natural birth, its mere existence proves it to be a useful million of the hundred thousand millions in which it lives and moves. Who follows its work with his whole heart, and for itself, must needs be one whom the best may envy and approve. Who follows its work with no heart, and for himself alone, must needs be one the worst may pity and contemn. Its plainest, simplest work, well done, the world of physic must remain in fair comparison with all the world beside. Its noblest work realised, it must make all science subservient to its grand intents, and ultimately reveal the mystery of life with a clearness and simplicity that shall render only the more wonderful, and the more sublimely inapproachable, the wisdom of the 'uncreated, super-essential, and all-beauteous mind.'

VII.

BURIAL, EMBALMING, AND CREMATION.

FEW subjects are exciting more interest at the present time than the mode of disposal of the human dead.

In the controversy that has been and that is still being waged, various combatants present themselves. The hardy man of science and the studious divine, the enthusiastic layman and the sympathetic laywoman : indeed, we might include in the controversy all who expect to be disposed of after death, without greatly perverting the history of our time in relation to the question that lies before us.

The reason for so much controversy and so much difference of opinion on a very simple subject, lies in the diversities of sentiment which have ever existed, and which still exist, between different families of men, on the solemn subject of death and after-existence. To bury, to embalm, to cremate, are acts the inclination to either of which depends altogether

upon the disposition of those who have to carry these acts into practice. This disposition depends, not on reasoning, but on instinct. This instinct depends, not on accident, but on the most veritable of all human endowments, on the organic origin and build of the man, and of the men from whom the man springs ; in other words, upon racial and family dispositions and qualities.

The view that the varied modes of disposal of the dead are indications of varied forms of civilisation is indirectly supported by all the writers who have dwelt on the subject. The balance of opinion on the processes of committing,—‘earth to earth,’ or ‘ashes to ashes,’—is pretty nearly equal, and the care with which the ceremony of either process is performed shows that both are regarded with befitting solemnity, even by uncultivated communities. We know how, amongst our poor and ignorant masses, the most respectful, and, we may add, costly attention is paid to and for the act of burial. The same care and cost is in like manner paid, by the poor of other communities, to and for the act of cremation. On the ground, therefore, of mere personal respect for the dead, the one plan is much the same as the other in value.

Dr. K. McLeod, in an article in the ‘Indian Medical Gazette,’ for April 1, 1875, sums up all the modes of disposal of the dead except two. The

Hindoos, he says, burn their dead ; the Mahomedans bury without any coffin ; the Europeans bury with a coffin ; the Parsees expose their dead to be eaten by birds of prey. If he had added that they who live on the sea commit their dead to the deep, and that a few wealthy persons still call in the embalmer for the exercise of his skill, this statement would have been fairly complete.

PRIMITIVE CREMATION.

We are indebted to this author for one or two graphic pictures of the mode of cremation that prevails amongst the Hindoos, and of the mode of burial without any coffin which prevails amongst the Mahomedan populations. As these and other modes of disposal of the dead are each being considered and discussed at the present time, I may with advantage cull one or two interesting details respecting them.

To commence with the Hindoo system—that is to say, with the process of cremation in its natural home—we read the following facts. “The body is dressed in its best garments, and, after being decorated with flowers, is placed in the sitting posture, and is surrounded with piles of wood, the richer classes using the scented sandal-wood. Then, if the deceased be a noble or native magnate of some parts of India, the heir first breaks open the skull of the corpse with a

hatchet (to make sure, we presume, that the assumed dead man shall not be burned alive), after which he (the heir) lights the funeral pyre. If there be sufficient wood, and the wood is a good fuel-wood, and has been artistically arranged, nothing offensive is presented to either the sense of smell or of vision. The devouring element rapidly envelopes the different faggots until the whole is a mass of blaze, giving the beholder a very vivid idea that the 'rite' of suttee could not have entailed a very painful or prolonged death. Even should the looker-on allow the wind to pass between the flames and his nobility, he distinguishes nothing except, perhaps, the odour of burning wood, and he sees nothing except fire. Above the blaze and below the smoke, when the latter occurs from damp wood, there is a bright ethereal glimmer, somewhat resembling, but more diamond-like by far, the appearance of the distant atmosphere on a hot day. Then, as minutes pass, this glimmer subsides, and the flame lessens until nothing remains but an insignificant heap of greyish ashes. The body has changed to something else as different as the soul in its new Pythagorean abode. A pyre as big as that of Sardanapalus affords no protection to the ashes of the dead. Everything has gone, not, perhaps, to dust, but into those still more subtle ultimate elements from which the dust itself is derived. There is, indeed, as

a result of a well-conducted funeral pyre, an utter annihilation of the body. It can never, says our author—it can never again, as a substance, do either harm or good, either by resolution or by putrefaction. It has, in short, ceased to exist. Of course consumption is not thus complete at every funeral pile. At most Hindoo burning-places bodies half-destroyed by fire may be seen in great numbers, and it not unfrequently happens that during the process of burning there is some unpleasant effluvium. This, however, is simply the result of want of precaution or want of fuel, and is, therefore, only, or at least chiefly, noticed at the funeral rites of the poor and needy. With sufficient wood the destruction may always be rendered as complete as has been described."

From this excellent description of the Hindoo method of cremation we may turn with interest to an account of a similar process, as it is conducted by the sub-tribe of Pah-Utes, known as the Cotton Wood, Corn Creek, Spring Mountain, and Pah-rimp Spring Indians. The description is supplied to the 'Transactions of the American Philosophical Society' by Mr. W. J. Hoffman, who, in 1871-2, was attached to Lieutenant Wheeler's expedition through the territories of the American Indian tribes. The tract of country in which Mr. Hoffman found the practice of cremation to exist lies between 110° and 115° 35' west

longitude and latitude north 35° and 36°. Spring Mountain is the stronghold of the tribe, and is located just north of the 'Old Spanish Trail.' Upon the death of one of these Pah-Utes, Hoffman tells us, a pile of wood is prepared in the immediate vicinity ; this is so arranged as to form a rectangle, to the height of from two to three feet. The corpse is laid upon the pile, and the fire is started, after which wood is continually thrown across the pile until the body is reduced as much as possible. Mesquite, pine, and cedar are usually employed ; they form excellent fuel, and give an intense heat. All the remaining property of the dead,—the wearing apparel, arms, blankets, dogs, and horse (if the deceased possessed one)—is also burned. According to the belief of these Indians, when an Indian dies his spirit goes to the East, which they consider the 'white man's hunting-ground,' and where he would be unable to hunt were his spirit deprived of these valuable aids. The remains are then covered with earth, but whether they are really buried the author could not ascertain. Amongst thirty sub-tribes of the same Indian region, that of the Pah-Utes is the only one that 'cremates.'

MODERN CREMATION.

Such is an outline of primitive cremation as it is at present carried on in uncivilised nations. How far it resembles the ancient methods of Greek and Roman

days my readers are as capable as myself of forming an estimate. The modern civilised cremationist discards these methods of cremation. They are to him rude and costly and slow. He calls into his aid the skill of modern science, and if he does not destroy the dead organism and rend it into its elements with quite the same rapidity as the noble author of the 'Coming Race' with its 'Vrill force,' he makes some approach to that last-named wonderful imaginary agency. In the following description we take from Sir Henry Thompson an account of an experiment in which he cremated the body of an animal that weighed no less than 227 pounds, and was not emaciated. "The body was placed in a cylindrical vessel about seven feet long by five or six in diameter. The interior of the vessel was already heated to about 2,000° F. The inner surface of the cylinder was smooth, almost polished, and no solid matter but that of the body was introduced into it. The product, therefore, could be nothing more than the ashes of the body. No foreign dust could be introduced, no coal or other solid combustible being near it; nothing but heated hydrocarbon in a gaseous form and heated air. Nothing was visible in the cylinder before using it,—a pure, almost white interior,—the lining having acquired a temperature of white heat. In this case the gases, given off from the body so abundantly at first,

passed through a highly heated chamber, among thousands of interstices made by intersecting fire-bricks laid throughout the entire chamber, lattice fashion, in order to minutely divide and delay the current and expose it to an immense area of heated surface. By this means the gases were rapidly oxidised, and not a particle of smoke issued by the chimney ; no second furnace, therefore, is necessary, by this method, to consume any noxious matters, since none escape. The process was complete in fifty-five minutes ; and the ashes, which weighed about five pounds, were removed with ease."

Mr. Eassie, whose enthusiastic work on cremation is so well known, in speaking of the results of the cremation of the human subject as practised in a Siemens' furnace in Dresden, says that in the course of the process nothing whatever is seen that can in any way be considered objectionable. The body remains of itself perfectly motionless, and without visible contraction or convulsion. Several late human cremations, he states, have been purposely witnessed by eminently scientific men and others, through the glass panel door which is always provided for the use of the manufacturing operator, and the utter absence of anything which could prove the least distressing to the mind, the eye, or the imagination, is vouched for by all. The current of combined air and gas simply

plays upon the body with a transparent flame until the whole becomes incandescent. There is not even the least effluvium. Once incandescent, the body soon assumes a hue of translucent white, and then speedily crumbles into ashes. Entering still further into detail, Mr. Eassie suggests that if the practice should at all become general, the body to be cremated should be enclosed before cremation. The body, he thinks, should be placed in a coffin made of some light material, and taken in due time to the mortuary, ready for conveyance to the cinerator; and as it is desirable that the ashes of the body should be kept separate from those of any coffin, a shroud of some imperishable material will have to be carefully sought after by inventors. The ancient Greeks, he adds, made use of asbestos, which is a fibrous form of hornblende; and those Egyptians who performed cremation enclosed the body in a receptacle of amianth, a similar incombustible mineral substance. Whether these materials will resist the intense heat of a Siemens' furnace, he is not able to say; but wood, at all events, is likely to be rejected on account of the residue of carbon, which might not be easily separated from the more precious relics. Lead would be equally objectionable. In all probability the most suitable material for the inner coffin, which alone is to be submitted to the impingement of the hot blast, will be zinc.

This metal would entirely disappear in the furnace heat, the reason being that it is volatile, and would distil off below the minimum temperature that would reign in the chamber of the apparatus.

Mr. Eassie also prearranges for the changes in the service or ritual in the case of a dead body disposed of by cremation. He tells us that in one Dresden arrangement the body is lowered into a receiver below, and the idea of interment is thus in a manner preserved. In the English arrangement,—which by the way has not yet been carried out on the human subject,—the coffin is made to slide gradually into the receiver like a ship launched into water. The anguish induced by the moment of departure is in this way, he opines, somewhat ameliorated, as there is no noise of lowering machinery to grate upon the ear. He adds suggestively that at certain appointed words in our beautiful funeral service—for instance, at the words ‘ashes to ashes’—a curtain might be partially withdrawn, and the body, enclosed in a suitable shell, might gravitate slowly into the chamber of the apparatus, which would then immediately close noiselessly, to be opened only after the complete reduction of the body. The utmost privacy would be ensured, and no strange eyes could gaze upon the body during the period of incineration. The funeral service could, if desirable, be made to occupy the whole of the time

necessary for sublimation ; or an eulogy or other reference to the departed might form the subject of a discourse. The ashes could afterwards be collected and reverentially placed in an urn and conveyed to their last resting-place.

The uncivilised and the civilised methods of cremation, the proposed and the actual, are now before the reader. We may contrast these methods with some others that are suggested as modifications of burial in the earth.

BURIAL IN THE EARTH.

A modification of the ordinary system of burial common in this country is proposed by Mr. Haden as an improvement on the furnace system of cremation that has just been narrated. Mr. Haden proposes practically the mode of burial which is practised by the Mahomedans, with this difference, however, that whereas the Mahomedan places the corpse directly in earth, enclosed at most in a shawl or garment, Mr. Haden recommends that it be enclosed in a wicker basket or coffin surrounded with flowers, or enclosed in a layer of charcoal if the cause of death has been an infectious disorder. He instructs us that the body, "as soon after death as may be, is to be sponged, the eyes are to be closed, the chin supported, the limbs composed, and the hands crossed upon the breast.

Superfluous bedclothes, together with the impediments and rejectments of the sick room, are to be removed, and a window is to be opened a few inches, both at the top and at the bottom. The papers of the deceased may then be examined, and, if these contain nothing to forbid it, the first preparations for the funeral may be made in the following way. As part of the ordinary stock-in-trade of every turner, brush-maker, or basket-maker will be found, nested one within the other, and of every form and dimensions, the necessary covering or coffin; at every herbalist's or florist's, its garniture. Both, being light and portable, may be delivered at the house in an hour or two, and the body may be at once laid in it and strewn (except the face and hands, which should be left exposed) with its evergreen covering. All this may be done by the nurses or older servants or members of the family, and no stranger need be admitted. There is now ample time to consider arrangements—for the visit of the physician or surgeon charged to verify the fact of death, to telegraph to friends, and to make final preparations for the interment. The morrow comes, and everything prepared inside and out, the necessary agents for the interment will enter the house for the first time and the last, and remove the body in a suitable carriage, either by railway or by water, to its resting-place outside the city, one of

the male representatives of the family in every case accompanying it. There will be no procession through the streets—no opportunity for display—nothing to elicit either the sympathy or the criticism of the neighbourhood (both on such an occasion equally out of place) ; but, arrived at the cemetery, the body will wait in the mortuary chapel attached to it with those who are to be present at its interment. These, having been informed of the death, will go and return, as their desires, affections, or respect for the dead impel them. The assembly will be in the chapel, and at the grave-side only, where the mourners, men and women (for since there is to be no public display both may go), will find the trellised coffin on its bier—garnished and beautified by loving hands—awaiting them. Not a word of our burial service will be omitted, though more may be said in the chapel and less at the grave-side, and then all will be over. There will be no reunion at the house of death. The conventional feast will not be spread. The formal reading of the will, will be at the office of the legal adviser of the family on a day appointed for the purpose ; and the inmates of the house of mourning will return to it and be allowed to remain undisturbed. Next day everyone will to his business.”

With Mr. Seymour Haden I think that it would be vain to construct the best burial-ground if the

present system of enclosing the dead in coffins of wood or iron or lead were to continue. The coffin should be nothing more than an easily destructible shroud, in which the mortal remains may be concealed from view until they are deposited in the earth. The present coffin is after the mode of an Egyptian sarcophagus, and is probably an imitation of that receptacle. In the form of this receptacle there is nothing objectionable, and if the popular taste wills that it shall be maintained, so be it. But the structure must be so modified that the instant the body is placed in the earth it shall either be in direct contact with the surrounding earthy matter or shall be separated from it by some simple organic material that is easily and rapidly destroyed. The newly proposed wicker coffins would probably answer the purpose intended, fairly; but they have the fault of not being sufficiently destructible. A return to the ancient bier and to the primitive mode of simply enveloping the body in cloth would be by far the most rational modification.

It is presumed by some who advocate this direct mode of burial that interment should in all cases be carried out within a short interval after death; that a period of not more than thirty-six hours should be allowed to elapse between the cessation of life and the disposal of the lifeless body in the ground. There can be no doubt that the method of placing the body in the

coffin, and of partially or temporarily closing it up, has led to much error in the manner of detaining the dead among the living, and it is not less doubtful that when, in any instance, actual decomposition of the tissues has commenced, the time for interment, however short it may be, has fairly arrived. The system of burying without the coffin would therefore, in a sanitary point of view, be of advantage. It would lead to interment, in every case, so soon as the direct evidence of decomposition had set in, and in the majority of instances that would be within forty-eight hours from the time of the demise. Third-day burials would become the rule. This period would be sufficient to establish the fact of death on the one hand, and to prevent injury to the living on the other.

The kind of earth that should be placed in the cemetery, and in which the dead should be buried, requires some minuteness of detail. The construction of the soil of the burial-ground is of first moment, and might readily be made matter of legislation. The soil that is most fitting for this purpose is a fine carboniferous mould, or a mixture of carbon and sand. In such a soil the complete removal of the body might, under proper conditions of burial, be secured within a period of five years; and in such a soil renewal of burial might be carried out after every such interval. In Naples it has been customary to bury

in pits of earth in which lime has been placed ; to bury so many bodies in one section on a given day ; to allow that section to rest for a year ; then to remove the whole of the earth of the section with its organic remains, to refill with new earth and bury again for the year in the new earth. In this country such a prompt system would not be tolerated ; but the method of burial in a destructive, though more slowly destructive, bed, would meet probably every view, without creating undue prejudice at the commencement of the reformation. In some localities a natural soil would yield all that is wanted for a perfect burial in earth. In other localities the earth would have to be specially constructed. A series of carefully conducted experiments on the destructive powers of various earths are required before a perfect system can be evolved. It will probably be found that an earth composed of equal parts of fine carbon soil, sand and lime, would be the most rapid of all combinations for the destruction of the animal matter with absorption of the products of decomposition. In a cemetery correctly constructed, with twelve feet of prepared earth as its basis, the soil might remain undisturbed, except for the purposes of burial, for many years, long enough, certainly, for the burial-place of the majority of the dead to be forgotten, and for the dead body to pass into entire reunion with

the earth from whence it sprang. After a given and due time, without any injury to sentiment, the soil could be removed in sections, and could be resupplied with new soil for new burials.

The artificial soil which would prove the most effective for the purposes of burial is suggested as above from the facts I have gleaned during the direct observation of the action of different substances on dead organic matter. Specimens of such matter buried in pure carbon, in virgin carboniferous earth, in a mixture of carboniferous earth and sand, and in this latter mixture to which lime had been added, were found to undergo quick resolution, in the last most, in the first least effectively. A fresh carboniferous earth answers exceedingly well, far better than simple vegetable carbon. The rapidity with which it deodorises even decomposing animal matter is most remarkable. It may be said to act in a matter of minutes. The rapidity with which it produces destruction of the organic substance, especially if it be kept dry, is equally surprising. The complete destruction may be included in from twenty to thirty weeks. It is worthy of remark, however, that all the parts of an animal body are not equally destroyed. The integumentary parts and the membranes are more slowly destroyed than the muscular, and the muscular parts are more slowly destroyed than the nervous.

The bony parts are more resistant to destruction than the integuments, and the pigments are more resistant than bone.

It is not assumed that the above-named description of a prepared earth for the cemetery is perfect. It is an approximation to the truth. A carefully conducted series of new experiments are required to bring out the precise necessity.

It is possible, and indeed probable, that in course of time many of these details will gradually come into action. The most probable reform is that which relates to coffins. It is not likely that the English people, in imitation of Mahomedan populations, will ever cast the body of the dead man into the ground 'like a dog' when it is committed to the earth ; but that the heavy wooden coffin and the costly covering of lead will be dispensed with I have little doubt.

THE PARSEE GARDEN.

The silent garden of the Parsee, in which he exposes his departed to the havoc of the carnivorous birds of prey, is a practice of disposal of the dead which amongst the civilised nations of the earth would not, I think, gain friends even if the birds of prey were ready to perform the task of burial. Diogenes himself, sharp as was his satire when he begged for the little stick to be laid by his dead body, that he

might drive off the carnivora, and trite as was his argument founded upon the request, could hardly persuade the modern European, American, or other representative of modern civilisation, to follow the Parsee to the place of the Parsee dead.

EMBALMMENT.

The mode of disposal of the dead by the process of embalming, a mode very ancient, and in respect to the disposal of ruling persons, all but universal, is still likely to retain its place under some conditions. It deserves a passing notice here.

It has been urged against the art of embalming in modern days that it is an objectionable and unnecessary art. I agree that it is not often necessary to practise it, but it is not true to say that, when it is in this day properly carried out, it is actually objectionable. It is not more objectionable than the performance of a post-mortem examination, and, like that scientific procedure, it is on some occasions of service, as I shall indicate in the proper place.

The ancient methods of embalming, when compared with the present, were singularly rough and laborious. The ancients devoted days to a task which we can, under urgency, carry out in as many minutes. In the history of the art of embalming we have a record written four hundred and eighty-four years

before the commencement of the present era, that is to say, a record of two thousand three hundred and sixty-two years. This same record relates to a process which had been carried out, in practice, long before the historian penned his description, so that when we speak of embalming we speak of one of the earliest arts of civilisation.

Embalming, as we read of it, could only have been carried out by a civilised people, a people that had some knowledge of anatomy, and a certain crude, but practical, knowledge of chemistry. Herodotus, who himself must have studied the details of the art with close observation, states that there were in Egypt in his time certain persons who were especially appointed as embalmers, and who professed the art. Some have looked on these professors as priests, others as physicians: it is probable they followed both avocations. The embalmers, when their services were called for, showed the friends of a deceased person a wooden model, painted so as to represent as nearly as possible the original. The models were of three different values, and apparently of different solemnities. 'The most perfect of the models,' says Herodotus, 'is asserted to be the representation of him whose name I take it to be impious to mention in this matter.' The second was less finished, and the third was the meanest of all. The relatives had

to declare which of the models they chose, and they chose according to the price they undertook to pay. Then they retired, and left the body of their deceased friend with the embalmers. The embalmers commenced their proceeding by extracting the brain of the dead person from the cavity of the skull, through the nostrils, by means of a bent iron (a hook in common parlance), and by the infusion or pouring of certain drugs into the cavity of the skull. In these ways they removed the brain without disfiguring the head or face—an operation which may seem difficult, but which, practically, would present no real difficulty at all when a little experience in operating had been acquired. The contents of the skull removed, the abdominal cavity was next opened with a sharp Ethiopic stone, and the intestines were removed. Herodotus does not tell us what was done with these internal parts, but the information is supplied by Porphyry, who states that the intestines were put into a chest, and that one of the embalmers, having offered up a prayer for the deceased, addressed the sun, the purport of the address being to signify that if the dead man during his lifetime had been criminal it must have been on account of these parts. Then pointing to the chest or box containing the parts, it was thrown into the Nile. The story is of singular interest, as indicating how early in the history of

man the idea became prevalent that the passions had their seats, not in the reasoning brain, but in the bowels. This, by the way. The narrative of Herodotus goes on to describe that, after the cavity of the body was emptied of its natural contents, it was charged with powder of pure myrrh, cassia, and other perfumes, but not frankincense. The body was then sewn up, and covered with nitre and natron for the space of seventy days, which time might not be exceeded. At the end of that period the body, removed, washed, and closely wrapped in bandages of cotton dipped in gum,—which the Egyptians used as glue,—was returned to the relations, who enclosed it in a case of wood, made to resemble a human figure. It was, finally, placed against the wall in the repository of the dead.

Embalming at the present day is an exceptional process in England, and when we are called upon to perform it here, it is, in ninety-nine cases out of the hundred, for some one foreign to our country. I have embalmed many bodies, but only in two or three instances the bodies of English people, and in these exceptional instances the deceased, although they were born and died in England, had lived the greater part of their lives abroad, and were embalmed in order to be conveyed to friends at a distance, who wished to bury them. In the United States of America the embalm-

ing process is carried out to a greater extent, and I believe the number of persons embalmed in that country increases every year. Hence, Americans who are residents here often ask to have friends or relations embalmed.

The reasons assigned for embalmmnt are numerous,—some valid, some perhaps fanciful. In most cases on which I have been consulted, the object of the embalming has been to retain the body free of putrefactive change long enough for it to be conveyed from the place where it died to some distant place where it is finally to be entombed. This object is in every sense reasonable. In other examples the embalming has been sought after that the relatives may retain the dead body as long as they can with the face exposed to view. For such purpose coffins of a special kind have to be made, in the lids of which a pane of glass is placed. In England these receptacles for the dead are not often constructed; but in America they are specially constructed, and I learnt that one body which I embalmed in England was, on its arrival in America, transferred to the particular receptacle described, in which (with the face still perfectly preserved) it is retained.

Once I knew the embalming requested to gratify the last direct wish of the deceased, who feared unless this precaution were taken she might be buried alive.

It was not necessary, of course, to embalm to ensure against that terrible calamity, but the desire had to be carried out. The lady was afterwards buried in the usual way.

I offer no opinion as to the propriety of embalming for the purposes above described. The question involved in it is one entirely of feeling. I may only add that the process is harmless to everybody; it involves, I mean, no breach of sanitary rules if it be properly carried out.

Embalming is sometimes performed on distinguished persons as a supposed mark of distinction. For ages upon ages this intention has been acted upon, and has become, in a certain sense, a fashion. Probably, if the distinguished personages of ancient Egypt who were embalmed with so much care could have foreseen to what base uses their preserved remains would in the course of time come,—that they would stand, in fact, as the shows of another civilisation,—they would have been anxious to have been consigned at once to the earth after their deaths, or even to have been resolved on the pyre. Yet to this intention of embalming there are two sides. To the historian these remains of what once were mighty men possess an interest of no mean character, and he who would wish to trace the correct line of the Pharaohs, regrets, I doubt not, sincerely, that the

embalmers of these royal personages were not more successful in their art. It must be admitted, however, that this object of embalming has been abused. To embalm a distinguished man, that he may lie for long periods in the embalmer's room to be stared at by multitudes of people as a pseudo-scientific sight, is a degradation of scientific labour.

Occasionally, the art of embalming may prove of service for the benefit of the public—that is to say, for the promotion of public justice. It may be necessary to embalm a body in order that it may afterwards be identified; or it may even be necessary to preserve the whole or parts of a dead body in order that it, or they, may be submitted to analysis or other mode of investigation.

There is yet another object for the public good in which the skill of the embalmer is useful. There are circumstances when it is not possible to bury a body immediately, and where it is necessary to keep it in such a state that it will neither undergo decomposition, nor be calculated to be injurious to the living who are near to it. Here it is of moment to know how temporarily to check the decomposition and prevent the diffusion of poisonous gases from that source.

I have dwelt for a few moments on these subjects of embalming, without minutely arguing any point that may be raised upon them, in order to show that

the art is one that is demanded on various grounds, and is not likely to fall out of demand. As this is the undoubted fact, I think it is right for medical men to retain and even to cultivate the most perfect knowledge of the art. If they do not scientifically carry it out, other men, mere empirics, who know nothing either of chemistry or of anatomy, will attempt to do so, the public will be defrauded, and an art, which really rests on the purest basis of science, will be brought into unmerited disrepute.

There is nothing so difficult in the process but that any practitioner can perform it as easily as he can perform a post-mortem examination. One quality only does it call for, and that quality is patience. It is true that in these days the operators are rapid to a marvel when they are compared with our old friends the Egyptian embalmers. The moderns require hours, the ancients required days; but still, to embalm well, some considerable patience is demanded even now, notwithstanding all the modern knowledge and modern appliances.

The present method of embalming is also most simple when it is compared with the ancient. A large artery of the dead body is exposed and opened, and into the vessel a hollow needle is inserted. The needle is firmly tied in its place. Through the needle a solution of chloride of zinc is injected slowly

until it has found its way over every part. The principal art that is required in this process is to be very careful not to use too much fluid, and not to use too much force in injecting the fluid into the tissues.

BURIAL IN THE SEA.

A suggested plan of burial in the deep sea carries with it many inducements. It insures a method for the immediate disposal of the dead as effective as cremation, in so far as the living are concerned ; and from what we know of it as a practice at sea, it is, to the mourners, as simple and inoffensive as the burial in the earth. It has the disadvantage that it is not readily available to inland populations, and that it too effectively disposes of the body to satisfy, in every case, the demands of the law.

CREMATION AND EARTH BURIAL.

Practically, we are at this moment driven to deal with cremation and burial in the earth as the two modes for the disposal of the dead most consonant with our modern civilisation. For my part, I am free of all personal prejudice as to these modes ; but, if my own feelings were really influenced, it would be towards cremation. I confess to feeling as the English lady felt, whose remains, by her own request, were subjected to the cinerator at Dresden, that the

readiest, most certain, most wholesome way of being disposed of after death, is to go through the fire and remingle with the air. What, therefore, I have to say in respect to this method and its relative value will be based on what seems to me the true scientific and legal aspects of the question.

Speaking, in this sense alone, of cremation, while I admit for it that it is quite practicable as a general process, and as free from any, except morbid, objections in matter of feeling, and, as a sanitary measure excellent, there are against it two objections which seem to me so powerful as to render it difficult of introduction, for general application.

The first of the grand objections to cremation has been advanced with great force and effect by Professor Mohr. It is that if the process were universally adopted and if all animal remains passed, for ultimate destruction as organic matter, into the hands of the cremator, the organic world would lose one of its important constituents. If cremation is to be adopted there must, he urges,—and indeed all admit this argument,—there must be such complete combustion that not a trace of organic vapour or gas can escape from the retort. Any trace of odours and foetid compounds escaping from the retort, anything in the nature of a distillation, would be so revolting that no one would tolerate the procedure, and no idea

of value from the products thus given off would compensate for the moral objections that would be made. To produce the perfect combustion the temperature must be raised to a degree that shall render the combustion final. The very gases that are evolved from the burning of the body must pass through heated earthenware lattice-work, so that they may be transformed into what can fairly be designated true inorganic parts. Nothing must remain but carbonic acid, nitrogen, water, and ash.

In this complete combustion there is the widest possible departure from the mode in which nature, by her own processes, disposes of dead animal matter. Her plan is to produce, in the course of decay, secondary or intermediate products which shall again prove of service to the vegetable and, through the vegetable, to the animal kingdom. One of these products, the staple of the vegetable kingdom, is that combination of hydrogen and nitrogen known as ammonia. As yet we have in chemistry no artistic synthesis of this body by which it can be made available for the purposes of organic growth, and so we depend for the natural development of it, we may say exclusively, upon the natural decomposition of dead animal organic remains. What, therefore, would be the ultimate fate of the living organic world if the whole of the dead organic matter derived from the bodies

of the dead were swept at once by intense heat into inorganic compounds which have no sustaining property for the vegetable kingdom? In the simple natural process the intermediate product, the ammonia resulting from decomposition, escapes into the air or is washed into the soil, is absorbed by the plants, is transformed into nitrogenous tissue by them, and becomes in turn available as food for animals. By this wise and provident means a continuous circulation of ammonia between the animal and the vegetable kingdoms is sustained. If we were to stop the supplies thus afforded, we should disturb the natural balance, and should so draw upon the ammonia capital of the globe, that in the course of time, if the spendthrift proceeding were kept up, the loss that would be sustained could not but be felt through the whole of the animal kingdom, and could not but lead to a reduction of animal life. In the case of the loss of ammonia the mischief is inconceivable. There is here no order of compensation going on in nature, as in the process for the renewal of atmospheric oxygen to breathing animals, but the deduction is from a finite quantity, and the descendants of the present races would have to bear, should we subject them to the ordeal by our short-sighted policy, the evil of our error as we have now to endure the results of the folly of our ancestors who ruthlessly cut down vast

forests, thereby incurring the penalties of drought in some regions and of flood and inundation in others.

What is more, in the act and art of cremation we incur a second evil of deduction from a finite quantity. To cremate we must employ fire: to employ fire is to deduct so much from the finite materials which give forth heat. In a word, we must burn the candle at both ends, and have no manner of compensation beyond the present satisfaction rendered to a few minds, from the favour or caprice of a fashion, that defies natural capital and natural law.

There is, however, another side to this question of economy of the resources of nature which should in fairness be put forward. Sir Henry Thompson sees in the application of the bone ash of the burned dead what we may call a 'quid pro quo' for loss entailed by other means. That we may miss no point of this able argument, I give this author's view in full. Let us, he asks, glance at the economic view of the subject of cremation.

"It is not so important as, unconsidered, it may appear. For it is an economic subject whether we will it or not. No doubt a sentiment repugnant to any such view must arise in many minds, a sentiment altogether to be held in respect and sympathy. Be it so; the question remains strictly a question of prime

necessity in the economic system of a crowded country. Nature will have it so, whether we like it or not. She destines the material elements of my body to enter the vegetable world on purpose to supply another animal organism which takes my place. She wants me, and I *must* go. There is no help for it. When shall I follow—with quick obedience, or unwillingly, truant-like, traitor-like, to her and her grand design? Her capital is intended to bear good interest and to yield quick return: all her ways prove it—‘increase and multiply’ is her first and constant law. Shall her riches be hid in earth, to corrupt and bear no present fruit; or be utilised without loss of time, value, and interest, for the benefit of starving survivors? Nature hides no talent in a napkin; we, her unprofitable servants only, thwart her ways and delay the consummation of her will.

“Is a practical illustration required? Nothing is easier. London was computed, by the census of 1871, to contain 3,254,260 persons, of whom 80,430 died within the year. I have come to the conclusion, after a very carefully made estimate, that the amount of ashes and bone earth, such as is derived by perfect combustion, belonging to and buried with those persons, is by weight about 206,820 lbs. The pecuniary value of this highly concentrated form of animal

solids is very considerable. For this bone-earth may be regarded as equivalent to at least six or seven times its weight of dried but unburned bones, as they ordinarily exist in commerce. The amount of other solid matters resolvable by burning into the gaseous food of plants, but rendered unavailable by burial for, say, fifty or a hundred years or more, is about 5,584,000 lbs., the value of which is quite incalculable, but it is certainly enormous as compared with the preceding.

“This is for the population of the metropolis only: that of the United Kingdom for the same year amounted to 31,483,700 persons, or nearly ten times the population of London. Taking into consideration a somewhat lower death-rate for the imperial average, it will at all events be quite within the limit of truthful statement to multiply the above quantities by nine in order to obtain the amount of valuable economic material annually diverted in the United Kingdom for a long term of years from its ultimate destiny by our present method of interment.

“The necessary complement of this ceaseless waste of commodity most precious to organic life, and which must be replaced, or the population could not exist, is the purchase by this country of that same material from other countries less populous than our own, and which can, therefore, at present

spare it. This we do to the amount of much more than half a million pounds sterling per annum.

“Few persons, I believe, have any notions that these importations of foreign bones are rendered absolutely necessary by the hoarding of our own some six feet below the surface. The former we acquire at a large cost for the original purchase and for freight. The latter we place, not in the upper soil where they would be utilised, but in the lower soil, where they are not merely useless, but where they often mingle with and pollute the streams which furnish our tables. And in order to effect this absurd, if not wicked result, we incur a lavish expenditure! I refer, of course, to the enormous sums which are wasted in effecting burial according to our present custom—a part of the question which can by no means be passed over. For the funeral rites of the 80,000 in London last year, let a mean cost of ten pounds per head be accepted as an estimate, which certainly does not err on the side of excess. Eight hundred thousand pounds must therefore be reckoned as absolute loss to the costs already incurred, in the maintenance of the system. Thus we pay every way and doubly for our folly.

“The problem to be worked is—Given a dead body, to resolve it into carbonic acid, water, and ammonia,

and the mineral elements, rapidly, safely, and not unpleasantly."

With this proposition I entirely concur. It is in truth *the* problem. My argument is that the problem is not solved by the process of cremation.

It is perfectly clear that the error which the advocates of cremation fall into when they advance the economical side of the question is twofold at least. They obviously overlook, in the first place, the all-important fact that by the very perfection of their art they break up the most valuable of the products of natural decomposition, viz. the ammonia. If they did not succeed so far, their process would give rise to the emanation and distribution of vapours that would be detected by the smell, and the success of perfect purity to every sense which they claim to have attained would be utterly forfeited. On this ground, consequently, the economy they assert is not maintainable in the controversy. The process is one of the direst waste, for by it the very organic matter of the skeleton, which is so valuable as an ammonia-yielding product, is resolved into its primary parts, its nitrogenous plant-forming value unredeemed.

In the next place an error not less important, and exceedingly obvious, creeps into the advocacy, when the subject of the value of the bone-earth comes before us. No one would deny the value of the bone-

earth as a fertilising substance, and no one would deny, we presume, that in cremation the inorganic bone-dust is very effectively preserved. But it is not easy to see how this precious material—precious as a relic of the dead,—precious as manure,—can act both kinds of preciousness at one and the same time. I mean by this that if it be stowed away in an urn it cannot fertilise the earth. I allow that in due course of time it will by chance of fate come at last to the earth, and therefore will not be lost. Here the cremationists are right ; but they are wrong, and in this their second great economical error lies, that they consider themselves performing a novel and wonderfully saving plan by burning instead of burying dead bones. As if bones did not resolve in the earth ! As if the phosphorus and lime which make up the inorganic residue of bone-matter could ever be lost by the act of banking it in the place from whence it came ! We need push the argument no further. The man that burns a bone and puts the ash in an urn is certainly not doing more for the earth than the man who directly restores the bone to the earth. The difference simply is, that the first is a miser, the second a prudent husbandman.

Looking at the subject of cremation, then, from these points of view,—looking at it as a conservator or a destroyer of the natural order of events, and of

material changes,—I hold it to be a failure in relation to natural economy.

The second grand objection to cremation is of a different order; and although in course of time it might lose its force, it is at present potent in the first degree. The objection is medico-legal. It is urged that if a body destroyed intentionally by poison, or by any other secret and unlawful means, could be carried straightway to the furnace, and, in the course of an hour could be resolved into its all but elementary form, the course of justice would constantly be arrested; and, not to mince the matter, the cremator would not unfrequently be the unwitting slave and instrument of the murderer.

The difficulty in way of cremation, from the risk above stated, is not ignored by the cremationists. They treat it as 'an episode' in the discussion,—a mode of treatment ingeniously expressed, but indifferently reasoned. Sir Henry Thompson would meet this difficulty by having appointed over the dead a new officer,—a sort of universal omnipresent coroner, who should take the place of the 'Médecin Véricificateur' of Paris, without whose permission no burial whatever can take place. In cases where there existed any doubt as to the cause of death he (Sir Henry) would take a strong precautionary measure. He would have the stomach and a portion of the

viscera preserved, say for fifteen or twenty years, or thereabouts, so that, in the event of any suspicion subsequently occurring, greater facility for examination would exist than by the present method of exhumation.

I need not dwell at any length on these propositions. In this country, where the coroner has even now so much to contend with in conducting his comparatively simple inquiries,—simple, I mean, in so far as the liberty of the subject is concerned,—the ‘*Médecin Vérificateur*’ would indeed stand a poor chance of being able to carry out his onerous duty. Here, in fact, such an officer and such an office would be utterly impossible, because repugnant to the genius of the people. The second proposition, that in suspected cases of poisoning portions of the dead body should be kept *in terrorem* over the heads of persons, known or unknown, who were guilty of murder, is even more inconceivable than the first. Where would such relics be stowed? How would the continuance of their identity be maintained? How could it be proved that in the course of ‘fifteen or twenty years, or thereabouts,’ between the times when they were stowed away and the times when they were taken out to be analysed, they had been free of all possible chance of contamination? More than this, when a body has to be exhumed there is probability

that the person or persons suspected of foul play may have succeeded in getting the body buried before the suspicion occurred. If, then, such cunning and wicked persons could succeed in committing the body to the earth, could they not, under the proposed new system, succeed also in committing it to the fire, and, if they did succeed, of what value were the analytical skill that has so frequently, under the present system, led to the detection of crime? I speak with no diffidence, because it is my duty to speak with earnestness, and my privilege to speak with the authority of forensic knowledge, on this subject; and I affirm that in the present social state the introduction of cremation as a general system of disposal of the dead would be a direct and effective incentive to the perpetration of the most hideous of crimes. Let no man deceive himself or others on an issue so solemn. The living world is not yet sufficiently purified in its soul to be permitted to purify itself from its dead tenements of soul, by the unanswerable fire.

So I come at last back to the old old story. The earth gave up to us from itself the substance of our corporeal organisation, the earth demands the substance back again. This is the order of nature, and to fight against the fact is waste both of word and labour. On the line with nature we may improve as we like—to invent is impossible—and remain secure.

Off the line we may make a noise, and astonish the mere lookers-on, but go straight away we cannot. It is open to us to improve the process of burial, and many of the plans which have recently been suggested are deserving of our best consideration. The suggestions to burial boards issued by the inspector under the Burial Acts indicate on every page the desire to introduce every available improvement, and I do not doubt but that the controversy on cremation will tend to direct public opinion in the right way to improvements in the art of burial. To these advancements I have still to refer in detail.

We have already considered what would be the best character of soil in which to place the dead. To understand the practical value of those suggestions, and the reforms that would have to take place before they can be carried out, it is necessary to recall the views which are entertained by our Government authorities who hold office under the Burial Acts. The report of the very able Inspector under the Burial Acts, Mr. Holland, comes before us with great effect at this point of our subject; and if my readers have not had an opportunity of studying the official suggestions that have been supplied, I shall be rendering a service by devoting a few paragraphs to them. In speaking of the character of the soils of burying-grounds as a subject of great importance, the

Inspector says that "dry, open soils which readily admit air and moisture, allowing the rain which falls upon the surface to enter readily, carrying air down with it, facilitate decay, and permit graves to be sooner re-opened for subsequent interments. Porous soils, mixed with vegetable mould, absorb and decompose the products of decay, and prevent the escape of injurious emanations, if the quantity of animal matter be not too large in proportion to the area, and if the soil near the coffin be left undisturbed until decomposition is completed. Dense clay soils are in all respects undesirable ; they exclude air and moisture, retard decomposition, and render it improper to reopen a grave, to nearly its original depth, within any reasonable period. In some such soils coffins have remained undecayed for thirty years or more, and therefore graves in such soils can be used a very limited number of times only. They are, moreover, expensive to drain ; they retain the gases of decomposition, and sometimes crack, possibly allowing dangerous exhalations to escape. It is so difficult and expensive to remedy these defects, that it is better to select an open than a clay soil, even though the site be moderately more distant, or more costly. In some such cases the plan has been adopted of enclosing separately every coffin buried in concrete or cemented stone or brick-work, the extra cost of which

is to be set against the diminished cost of less excavation, and less rapid filling of space.

“Soils which have no proper mould, and which consist chiefly of stone, may allow of the passage of undecomposed emanations, and it is difficult and expensive to supply the mould in which they are deficient. It is always desirable, before deciding upon a site, to have the soil examined in various places to the depth of at least eight feet.”

Much attention has been paid to the planting of burial-places, and we know that now, in the cemeteries near to our large towns, considerable taste is shown both in fencing, planting, and cultivating vegetation. In his supplementary report on the practice of interments in towns, Mr. Loudon recommends for cemeteries “trees chiefly of the fastigate, pointed, growing kinds, which neither cover a large space with their branches nor give too much shade when the sun shines, and which admit light and air to neutralise any mephitic effluvia. Of these, there are the oriental arbor vitæ, the evergreen cypress, the Swedish and Irish juniper, &c. For the same reason, trees of the conical forms, such as the red cedar, and various pines and firs, are desirable. In advantageously situated cemeteries, some of the larger trees, such as the cedar of Lebanon, the oriental plane, the purple beech, the dark yew, and the flowering ash, sycamore,

mountain ash, holly, thorn, and some species of oak, as the Italian oak, with flowering trees and shrubs, would find places in due proportion."

I have suggested that under a perfect system of burial, there would be demanded a modification of the present plan of planting the cemetery. My recommendations, which are not very different from those of Mr. Loudon, are to surround the place with trees, not too thickly set, and that to plant small and handsome trees in different parts of the grounds by the side walks and in odd spots where the earth remains undisturbed, would be unobjectionable. The rugged elm and yew tree's shade might still encircle the homes of the dead, but inasmuch as the earth in which the burials are made should be a moveable earth, it would be impossible, except in particular instances, to plant over any one body any special or lasting tree or shrub. The ground, levelled at once after burial, should be covered with rapidly growing vegetation; such quick-growing grasses as can be mown and utilised either as food for the herbivorous animals or as manure for other land. Thus the products of decomposition from the dead, which by diffusion would find their way to the surface, would be removed, by their transformation into new forms of matter, as rapidly as they were evolved and distributed.

Mr. Holland, who also favours the planting of evergreen and quick-growing trees in cemeteries, supplies useful directions on the position the trees and shrubs should hold in the grounds. It is of importance, he tells us, "that trees and shrubs should not cover too large a portion of the burial-ground, and that they should not be too closely planted, or should be thinned out as they grow large, to avoid interfering with the ventilation and with the free passage of air. A suitable disposal of trees or shrubs along roads or pathways would afford shelter to persons visiting graves, and to funeral processions. It is customary in well-regulated cemeteries to avoid burying close to the boundary fence. On many accounts this is advisable, as there is no law to prevent houses being built and wells sunk close to a burial-ground; there is, moreover, a disposition to erect houses in the vicinity of ornamental cemeteries. Much of the evil may be prevented by draining the ground in such a manner as to prevent the water passing into the subsoil of the neighbourhood, and by the adoption of proper regulations as to burial; but it would nevertheless be advisable to leave a belt of land for planting between the fence and the nearest graves. This strip of ground would not be wasted, for part of it might be used as a walk, and part for ornamental shrubs. A surrounding belt of shrubbery

would contribute to the seclusion of the ground, and need not be so close as to check too much the free passage of air."

It happens in some localities, that these requirements for particular soils and vegetations are next to impossible of fulfilment. The carboniferous soil does not exist near to the communities for which it is required, and in the hard clayey bed of earth which is alone obtainable the resolution of the dead body is long delayed. Cemeteries fixed in such grounds are of all the most difficult to keep in proper condition, and many schemes in the way of draining have been proposed in vain. If any cemeteries are actually dangerous to the community these are, and so long as the cemetery system lasts, they will remain an equal trouble to the sanitarian and the engineer.

The best mode of burying in such localities is probably one which I indicated twenty years ago in the 'Journal of Public Health and Sanitary Review.' This consists in enveloping the dead in a layer of charcoal, a process which is, in matter of fact, nothing more nor less than a slow combustion. As a proof of the effects of charcoal in this respect it is recorded that the Messrs. Turnbull, the well-known manufacturers of charcoal in Glasgow, made the experiment of burying a horse. They surrounded the carcase of the animal with eight inches of charcoal, and dis-

covered that every portion of the carcase, except the skeleton, was destroyed within twelve months. They observed that during the whole of this time there was no trace of deleterious exhalation from the decomposing body; and they further observed that moisture from rain did not materially modify the destructive process. After reading the particulars of this experiment, I confirmed it on a smaller scale, by burying smaller dead animals in charcoal. Dr. Stenhouse has stated that peat charcoal would answer for the same purpose, and that the reduction of it to a state of fine division is not necessary.

Since the above-named proposition was made in 1855, the system advocated has many times been carried out, and I believe with success. The difficulties of its extension have arisen from the circumstances that the introduction of peat charcoal into common use has been much less easy than was originally anticipated, and that the price of ordinary vegetable charcoal has considerably increased. These difficulties, I fear, are not likely to be lessened in the future.

As we glance over what has recently been written, and take a final survey of the whole question before us, we are brought sharply to the conclusion that after all there is nothing that is new; nothing on which

we are able to form any conclusion of a novel character ; nothing that strikingly indicates a great revolution in modes of disposal of the dead. Cremation, with all the fascinations of science which surround it, and with all the advantages which science lends for its development, is, as we have seen, simply impossible as a general principle, at this imperfect stage of civilisation. It may one day take a prominent place, and it might, under an exceedingly wise legislative supervision, be *permitted* in this country even in this day.

I do not myself see, why the person who should wish to be subjected to cremation after death, should be denied the desire. But in every case where permission for cremation is granted by the State, the most stringent preliminary enquiry as to the cause of death should be instituted, either by the Coroner, the Procurator Fiscal, or some other competent public officer who could fully and satisfactorily testify to the cause and natural character of the death of the body about to be subjected to the cremation.

In the matter of burials in the earth I am convinced that steady improvements will continue. No one who recalls the old and loathsome grave-yards, and who contrasts these with the new and beautiful cemeteries which chasten and even adorn our towns and villages, can doubt that since the days of Mr.

Walker's magnificent protest against the existence of grave-yards in the midst of the living, advancements have been made which that ardent reformer could hardly have anticipated. What, therefore, may be the greater advancements in coming years, when the public mind is being directed to and led into a study which it has previously avoided rather than courted, it is impossible to say. But the duty of the man of science, in his capacity as a practical teacher of the people, is clear. It is his duty, without too severely wounding deeply-rooted prejudices,—which after all have their origin in the sentiments of reverence and affection,—to teach that nature demands for the perpetuation of the living present, not the far removal, but the quick return of the dead body into the mother earth; that the world of life, constructed from a limited supply of matter, rebuilds itself out of the quarry of death; and, that every plan which has for its object the restoration of the body to the earth, with the least possible interruption to the ordination of nature, should be accepted as the wisest plan, the best for the present, the best also for the future generations of mankind.

VIII.

THE REGISTRATION OF DISEASE.

IN order to arrive at a correct knowledge of the causes of the diseases of the community, and to see the way clearly and scientifically to the prevention of disease, the first great step consists in securing systematic and widely-extended tables of facts bearing on the existence of particular diseases, occurring at the same periods, in different localities, and under differing social conditions. This method of research would apply to all diseases,—to those which are fixed amongst us, such as cancer and consumption, and to those which are recurrent, such as measles, scarlet fever, and small-pox.

But, in recognising the necessity for the registration of all the diseases that afflict humanity, I do not think it a practical plan to broach the idea of a system of registration which should at once attempt to embrace diseases in their universality. I consider that registration will commence best by a plan that

shall confine the labour to disorders of a transitory and migratory character, I mean to disorders of the epidemic class.

These last-named affections offer themselves primarily to our consideration owing to the facts that they present an acuteness of outline and a demonstration which are peculiarly marked; they thus attract more immediate attention and become objects for contemplation to all practitioners of medical science, and not to these only, but to the public at large. I wish it to be understood, therefore, that in this communication I shall consider the question of registration in its simple application to epidemic affections.

For the sake of order, I will classify the subject-matter to be submitted under the following heads:—

I. The study of epidemic diseases.

II. Method of registration, its principles and objects.

III. The attempts that have been made to establish a method of registration.

IV. A plan for the complete registration of these diseases in England.

I. In the study of epidemic diseases we observe (however widely we may extend the list of the diseases) a unity, presenting a variety of phenomena. This is the fact first to be learned in our present study.

M. Jules Guérin, in the *Memoirs* of the Imperial Academy of Medicine for 1853 and 1854, admirably remarks, "that the study of epidemics, submitted as yet to too few regulations, and left too much to individual choice, has never rendered the service it is capable of yielding to science and to mankind.

"Considered in their highest characteristics, epidemics are the great manifestations of a sole and identical cause which impresses a uniform and well-marked character on all its products, leaving to surrounding actions only a limited and secondary influence.

"It results from this predominance of the great epidemical cause, that all the diseased individualities in the same epidemic have a general and principal resemblance, and exhibit only particular and accessory differences.

"As a consequence of this general proposition, epidemics become immense centres of observation, in which the extent, number, and diversity of the facts, and the variable conditions of their manifestations, are constantly throwing light upon the most obscure problems of disease. That which is only seen imperfectly, or in separate letters, in occasional diseases, may be read in large characters and entire words during epidemic visitations. The cause of the occasional disease is almost always feeble and isolated ;

and dividing its influence with the ordinary producing conditions of age, sex, constitution, and season, it gives rise to mixed and ill-characterised products, the comparison of which is a matter of difficulty. In a word, in occasional diseases the elements of uniformity are almost equally balanced by those of diversity, and the products are as the factors. In epidemics the essential cause is one and absolute, and of sufficient energy to take the lead. In the presence of these grand manifestations the mind requires to make scarcely any effort to seize at once and to compass in its entirety that which observation in ordinary diseases is obliged to seek, from its useful auxiliaries, analysis, comparison, and enumeration."

That which M. Guérin has here so ably written I would fully indorse. It is and must be clear to every thinking mind, that these great visitations of disease which ever and anon enter our homes, shaping the same course, presenting the same general features, destroying, on an average, the same numbers of persons, and passing away, as it were, in disciplined order, offer marks for the scientific inquirer, which ought at once to be read off by him, and to suggest to him how such grand and steadily governed armies of disease may be arrested in their march or even annihilated altogether.

But, when we look round at the progress which

has been made, and is being made, towards the perfect comprehension of these disorders, we see no system as yet, developed or developing, that promises anything like a successful attainment of objects as beneficent as they are great. The majority of observers, indifferent as to causes of disease, are content to rest their exertions on the remedial department of their art—in curing those conditions which ought never to have been permitted; whilst others, who look for causes and study prevention, are carried away by their own thoughts and experiences. Possessing no common language, guided by no standard, working by no system, their labours are confined to their individual intellects. They leave behind no data from which others may make a start, and offer no suggestive thought which their followers may work out to a solution. Nor are these the only shortcomings: there is another, having reference to the periods during which the disease should be studied, of no small moment.

The study of an epidemic admits of being pursued at two different times; first, when the epidemic is present and is supplying data; second, when it has passed and the data have been supplied. Unless this division of labour is introduced into the work, no organised system of observation will prove of avail. I believe, indeed, that half the want of success that has

appeared in the study of epidemic diseases has arisen from the fact, that by the majority of observers the diseases are only thought worthy of consideration at such times as they are present. Hence we see, during a serious epidemic visitation, all thoughts roused and every eye observing ; but no sooner has the visitation fled by, than, as if wearied outright by the duties of the task, all thought rests and every eye sleeps.

I need not say to what an extent this mode of conducting an inquiry is hasty, fretful, and useless ; but I would, for the sake of instituting a striking contrast and result, add this observation, that if the eclipses of the sun or moon had always been observed in the same manner as physicians have observed recurring diseases, the nature of an eclipse would have remained as yet an unsolved problem. Taken simply as a natural phenomenon, an eclipse resembles an epidemic in many particulars : it comes suddenly, it conveys to the unlearned the idea of irregularity, it lasts only for a limited period, it rouses the fears of the common mind to the fullest extent ; and amongst those who do not understand the subject in its simple, true form, every kind of vague and absurd theory is set up in reference to its causes. It is obvious, however, that the mere observance of an eclipse, *per se*, could never have explained the reason of its appearance, and have proved the truth of that reasoning, by the

prediction of a recurrence of the same phenomenon. More was required. (*a.*) The facts of the phenomenon had to be taken at the time. (*b.*) The reason of the phenomenon had to be collected from more general observations and relationships, from after study, and from a comprehension of the order and plan of the stellar universe as a whole.

In instituting this comparison between an astronomical and an epidemiological inquiry, I do not wish to lay down an absolute parallelism. I know, indeed, that such does not exist. But there is an analogy in the two studies; and my object is to show, that the time in which an epidemic is present is not the only time when such epidemic admits of being studied; nay, that the discovery of the laws of an epidemic visitation can only be attempted properly when the epidemic is fairly past, and when the facts which it has presented are fully laid out before the reasoner.

II. In instituting a method for the registration of disease, two objects must be kept fully in view. The first is the collection of all the facts relating to any current epidemic. The second consists in the classification, analysis and computation of the facts collected. In pursuance of the first of these endeavours four elements are required:—

1. The whole competent mental strength of the district or country in which the epidemic exists.

2. Uniformity in the system of observation.
3. A ready and easy mode of recording observations.
4. A properly constituted plan, by which the facts observed may be collected and prepared for subjection to analysis and induction.

In pursuance of the second great object a central authority is necessary. This authority, whether consisting of one man aided by an efficient staff, or of a board, ought to exist independently of the observers of the facts. The duty of this central authority would consist simply in analysing everything that was put before it, irrespective of all theories or suggestions. It should be composed of men well conversant with mathematical science, and who should have no other labours on their hands except those peculiar to their office as registrars of facts.

III. Attempts to effect a registration of disease have as yet failed. They have indeed been very few in number, many of them have been indifferently organised, and all of them have been miserably encouraged by the public and even by the scientific world itself. In France the State has physicians whose business it is to visit any place where an epidemic is raging, and to report the facts observed to the Minister of Agriculture and Commerce. But that any law relating to the diseases should be educed

from this plan is impossible, for the inspection is only made at particular periods, and then imperfectly. I believe, also, that the attempt, as it is carried out, leads to much jealousy between the physicians sent by the Government and the local practitioners.

In Germany, efforts at registration have been made by private societies of scientific men; but never to continue long in organisation and action.

In England, the Epidemiological Society,—certainly one of the most useful scientific bodies,—has made attempts, admirable in their way, to gather the particulars of special epidemics, such as cholera and diphtheria.

For a short time the Medical Officers of Health in London tried to establish a registration system, and with some success; but their efforts have now ceased.

To a certain limited extent the very valuable mortality returns of the Registrar-General have operated as a registration of disease. These returns are admirable as showing, on a grand scale, the mortality of epidemics, their prevalence, their course, their effects on the sexes, their relationships to season, and, it may be in an imperfect manner, their connection with meteorological conditions. Still, the returns are only useful, absolutely, as regards mortality. This, their original object, is their only direct good. They exhibit accurately the balance paid over

by disease to death, but not that which is paid over by health to disease.

In 1854, an endeavour was commenced in the 'Journal of the British Medical Association' to register diseases as occurring in connection with meteorological phenomena. Several stations of observation were appointed, and for some years, returns were supplied and published week by week. The scheme was good, but was too special in its intention. It ceased before any definite results were obtained.

The immense works, the Census of Disease in Ireland, may be looked on as connected with the registration of disease, as they have more than once supplied the facts of the amount and character of the diseases present on one given day in a country the social position of which was being chronicled at the same moment. But the information thus gathered, all-important as a standard, was struck out too suddenly to admit of analysis, as from a register of the progress of the disorders specified.

The history of the various attempts at registration of disease by other observers thus glanced at, I pass to notice my own experience of an attempt in the same direction, which, commencing in 1855, was carried on, without intermission, for four years.

The results of this attempt were published regularly each quarter in the pages of the 'Sanitary

Review': at one time as many as fifty fellow-labourers were working with me in the inquiry; and as the organisation was carefully laid, and the labour was sustained much longer, and on a larger scale, than in any previous attempt, I hope it may be acceptable to the reader to receive in outline an account of the plan on which the registration was carried on, of the working of the plan, and of the reason why it ceased.

My first endeavour was to obtain a certain number of stations in different parts of the country, and to supply to one or more of the resident medical men forms of returns in which they could note the current diseases. The first difficulty consisted in securing willing and competent observers, and this was great. However, in the latter part of 1854, I had the nucleus of a staff, and was able to receive reports from twelve stations—viz., Hastings, Bridgewater, Canterbury, Wanstead, Putney, Swansea, Saffron Walden, Bedford, Thetford, Nottingham, Hawarden, and Gainsborough. The observer in every case was a medical man enjoying a large share of practice, and possessing opportunities for knowing of the existence of any disease which might occur near to him. All were requested to confine their observation to the following allied disorders:—Scarlet fever, measles, small-pox, hooping-cough, croup, catarrh, influenza, erysipelas, cholera, ague, remittent fever, diarrhœa, dysentery, typhus, puerperal fever, and carbuncle.

To make their observations uniform, each observer was supplied quarterly with a sheet of which the following is a specimen:—

*‘Sanitary Review’—Local Report of Epidemic
and Endemic Diseases.*

INSTRUCTIONS FOR FILLING UP THE RETURN.

The object of this Return is to show what epidemic diseases have been present in certain localities during given periods of time. It is hoped that, from a collected series of these observations, taken in different parts of the kingdom at similar periods, much light may be thrown on the origin and progress of epidemics.

The mode of filling up the Table is simple. Each observer will, at the end of every week, place in its proper column a cross (×) opposite the name of such of the diseases mentioned as may have occurred in that period within the sphere of his observation.

As it is the object of the return to ascertain the presence of the disease named, rather than the number of cases, the occurrence of even a single case should be chronicled. But, observers who may wish to notice other important facts, such as the extent and mortality of an epidemic, its mode of origin or importation, meteorological phenomena, &c., may do so in the blank space headed ‘Additional Observa-

tions.' Observers will please return the Report, punctually, on the first days of March, June, September, and December.

Place of Observation _____

Latitude _____ Longitude _____

Quarter ending _____ 185

Week ending . . .							
1. Scarlet Fever . . .							
2. Measles							
3. Small-pox							
4. Hooping Cough . . .							
5. Croup							
6. Catarrh							
7. Influenza							

As will be seen from the instructions supplied with the sheet, the object of this return was to show what epidemics had been present in the localities of the observers during given periods of time. The mode of filling up the table was very easy. Each observer at the end of every week placed in its proper column a cross, opposite the name of such of the diseases as had occurred in that period within the sphere of his observation; and as it was the object of the table to ascertain the presence of the diseases named, rather than the number of cases, the occur-

rence of even a single case was chronicled. Observers who wished to notice other important facts, such as the extent and mortality of an epidemic, its mode of origin or importation, or meteorological phenomena, did so in the blank space headed 'Additional Observations.' The returns were made up to me quarterly. When all the returns of each quarter had been collected, they were analysed and tabulated as is shown in the following specimen table.

SPECIMENS OF LOCAL RETURNS FOR REGISTRATION
OF DISEASE.

PROGRESS OF EPIDEMICS.

*Local Reports of Epidemic and Endemic Diseases during the Months
of March, April, and May, 1857.*

Place	County	Latitude	Longitude	Observer
St. Mary, Scilly	Cornwall .	N. 49.56	6.5 W.	J. G. Moyle, Esq.
Teignmouth	Devonshire	50.32	3.29 ,,	W. C. Lake, Esq.
Odiham .	Hampshire	51.8	1.3 ,,	J. McIntyre, M.D.
Canterbury	Kent . .	51.17	1.4 E.	{ G. Rigden, Esq. W. Haffenden, Esq.
Chatham .	Kent . .	51.21	0.31 ,,	F. J. Brown, M.D.
Wands- worth	Surrey . .	51.28	0.7 W.	G. E. Nicholas, Esq.
Putney .	Surrey . .	51.28	0.8 ,,	R. H. Whiteman, Esq.
Upper Hol- loway	Middlesex .	51.32	0.03 E.	W. B. Kesteven, Esq.
Swansea .	Glamorgan- shire	51.38	3.50 W.	W. H. Michael, Esq.
Aspley Guise	Bedford- shire	52.1	0.37 ,,	J. Williams, M.D.

QUARTERLY STATEMENT.

[The dates denote that the disease appeared in the weeks then ending.]

SCARLET FEVER.

Canterbury—March 13-20, April
10-17, May 8-22.
Swansea—All April, May 8-15.
Bedford—April 10-17.
Beccles—March 20-27.

MEASLES.

Chatham—March 27.
Wandsworth—April 24.
Upper Holloway—March 20,
May 8-15.
Saffron Walden—March 13-27,
all April and May.

SMALL-POX.

Canterbury—April 17-24.
Chatham—March 20.
Swansea—May 22-29.
Sharnbrook—April 3-10.

HOOPING COUGH.

Canterbury—All March, April
3-17, May 1-22.
Chatham—March 6, April 10-17.
Wandsworth—April 24, May 1.
Putney—April 17.

CROUP.

Canterbury—April 10-17, May
8-15.
Chatham—April 3-17.
Upper Holloway—March 27,
April 10-17.
Swansea—March 20-27, April 3.

CATARRH.

St. Mary's, Scilly—April 24,
May 1-15.
Teignmouth—March 6-20, April
10-24, May 1-15-29.

DYSENTERY.

Teignmouth—March 13-27, May
22.
Chatham—March 6.
Wandsworth—March 27, April
3-10, May 1.
Putney—April 17, May 1-8.

TYPHUS.

Teignmouth—March 20, April 3-
10.
Odiham—March 13.
Canterbury—Every week.
Chatham—Every week.

PUERPERAL FEVER.

Putney—May 1.
Saffron Walden—March 27, April
3.
Newport Pagnell—May 8.
Alford—March 20.

CARBUNCLE.

St. Mary's, Scilly—May 1-8.
Teignmouth—April 24.
Canterbury—Every week.
Chatham—March 20-27, April 3.

VARICELLA.

Wandsworth—March 6.

ACUTE RHEUMATISM.

Wrexham—All March, April 3-
10.

I obtained from these tables at one glance a perfect view of the progress of the diseases named at given points of latitude and longitude, their prevalence according to season, the relative duration of each form of disease, and the order in which one epidemic followed another.

To these essential facts, much interest was added through the 'additional observations' made by each observer. Knowing well how much the time of the busy medical practitioner is occupied, and feeling sure that any intrusive and organised encroachment on his time and industry would be safe to carry with it its own destruction, I abstained from doing more than suggest what information would be most useful, leaving the details to volunteer effort. In the suggestions thus respectfully offered I took care, however, always to throw in major considerations. The following points of information were specially asked for:—

1. Notes of meteorological changes taken daily, and classified side by side with the report of disease.
2. Notes on the diseases of inferior animals, classified by the side of the diseases occurring simultaneously in the human subject.
3. Notes on the condition of the vegetable world and of the diseases of vegetables, classified in the same way.
4. Notes on the water supply of the different

stations, and on the real or apparent connection of such supply with the prevailing diseases.

5. Notes on the sanitary state of the station—of drainage, of food, of architecture, and, in fact, of the social condition in general of the locality.

6. Notes bearing on the mortality of the disorders specified in the returns.

7. Special note as to the method by which any given epidemic found its way into any given locality : whether a case of the same disease had been imported, or whether any article had been imported, which could have contained contagion.

8. Special note as to the outbreak of any new epidemic disease within the bounds of any station, and as to the mode of origin and propagation of such epidemic.

The plan thus arranged, I commenced the first publication of the labour in April, 1855. The reports came in from the twelve towns as stations of observation. In the next return, made the succeeding quarter, three new stations were enrolled, and I went on adding to the number, till, in 1858, I brought the number up to as many as forty-four stations. By this time the line of observation extended from the extreme southern to almost the extreme northern point of the island—*i.e.*, from St. Mary's, Scilly, to Lerwick, Shetland.

Divided into counties, the points of observation were arranged as follows, the names of the observers being also supplied :¹

Counties	Stations	Observers
Cornwall . .	St. Mary's, Scilly . .	Mr. Moyle
Devonshire . .	Teignmouth	Dr. Lake
Hampshire . .	Portsmouth and Odiham	Dr. McIntyre
Somersetshire . .	Bridgewater	Mr. A. Haviland
Kent, &c. . .	{ Chatham	Dr. Brown
	{ Canterbury, &c. . .	Messrs. Rigden and Reid, and nine observers by Mr. Haffenden

It would take up too much of the time of the reader to enter into the particulars of the whole of

¹ I am prevented by limitation of space from completing this table, which, in its perfect form, gives the names of all the observers who lent me their valuable aid in the labours now under description. I think it requisite to add the names of the remaining observers, and publicly to acknowledge how deeply indebted I am to every one who assisted me in these enquiries. The remaining names stand as follows: Dr. Whiteman, Putney; Dr. Nicholas, Wandsworth; Dr. Kesteven, Holloway; Mr. Cox, Hawkesbury; Mr. Michael, Swansea; Dr. Barker, Bedford; Dr. Williams, Aspley Guise; Mr. Stedman, Sharnbrook; Mr. Laver, Colchester; Messrs Spurgeon and Stear, Saffron Walden; Mr. Rogers, Newport Pagnell; Mr. Dalby, Wellingborough; Dr. Crowfoot, Beccles; Dr. Vincent, East Durham; Dr. Bailey, Thetford; Mr. A. Freer, Stourbridge; Mr. Houghton, Dudley; Dr. Thomson, Burton-on-Trent; Mr. Swann, Barrowden; Dr. Hole, Wisbeach; Mr. Cartwright, Oswestry; Mr. Eddowes, Pontesbury; Dr. Robertson, Nottingham; Dr. Williams, Wrexham; Dr. Moffat, Hawarden; Mr. Thorpe, Stavely; Dr. Lowe, Lincoln; Dr. West, Alford; Mr. Bickerton, Liverpool; Mr. Spinks, Warrington; Mr. Hussey, Wigan; Mr. Pendlebury, Bolton; Dr. Proctor, York; Mr. Radcliffe, Bramley (now of Loudon); Mr. Todd, West Auckland; Mr. Summers, Rothbury; Dr. Spence, Lerwick. Fifty-five in all.

the materials collected by these industrious observers. Their labours would make up, indeed, a volume of some 300 closely-printed octavo pages. I would, however, claim permission to offer a brief account of the working of this voluntary scheme. I may observe, then, that with care on the part of the collection, the reports were obtained with a regularity and precision which I had by no means expected, and that in the neighbourhood of the stations no material fact relating to prevailing epidemics was omitted. In many cases, moreover, all the additional particulars asked for were supplied with the greatest care. Meteorological records were kept by several of the observers, and the influences of the various meteorological conditions on the progress of existent diseases were accurately noted. In some cases, also, the diseases of the inferior animals were regularly reported, and connexions were traced as occurring between diseases of the lungs in the human subject and in the cattle of neighbouring districts. Some of these facts, affirmative in kind, were of great value, as tending to show that pleuro-pneumonia in the inferior animals is often co-existent with lung diseases in man of an inflammatory exudative character and of epidemic type.

In a vast number of cases evidences of the origin of diseases from local causes were cited with a circumstantiality which was irresistibly conclusive,

and over and over again the subsidence of epidemics on the removal of such producing causes was clearly demonstrated.

The occurrence of new forms of disease, and of peculiarities of types in diseases common to the neighbourhood, were supplied with much fidelity. Thus, the fact of the first cases of diphtheria that were ever recognised in England was first communicated to me by Mr. Reid, of Canterbury, and was published in Mr. Haffenden's quarterly statement for April, 1857, from the nine observers on his station. In a word, the working of the plan was as effective as the most sanguine could desire. As the records became known, fresh volunteers from different parts came in; and had I continued the proceeding I could in time have secured at least one observer in every large town in the kingdom. I could also have changed the character of the return so as to have received it monthly or even weekly. I regret to say that the success which so completely followed the effort was the immediate cause of its cessation; for in proportion as the registration became more effective, the expenses attendant on the carrying of it out became proportionately large, so that, after a four years' struggle to sustain it, I was compelled to relinquish the project altogether. I fear the same fate would attend any other single-handed effort in the same direction,

unless the conductor had an independency, or adequate assistance and encouragement from without. At the same time, after an experience longer by far, and much more laboured, than has ever before been gained in the registration of disease, I am convinced that the perfection of a system of registration, and the carrying of it into practice, is the most certain of tasks ; and, that an entire comprehension of the laws by which epidemics, at least, are governed would be the result of such a task, if it were well sustained for ten or fifteen years.

IV. The last point to which I would venture to direct attention has reference to a plan for the complete registration of disease in England. In 1854 I placed the details of this plan before the Epidemiological Society, and in January, 1858, I brought it again forward in the 'Sanitary Review.' I hope now to obtain for it a third and wider reading.

The principle on which this proposed plan is based consists in nothing more than a simple arrangement for transferring the present weekly returns of the Poor Law medical officers into accurate official records of the diseases of each parochial district.

Let us, for a moment, glance at the extent and capabilities of this proposed system of registration.

In the first place, the whole of England is fairly divided amongst the union medical officers. The poor

of the districts are mainly under their care ; and the inference therefore is tolerably safe, that no important epidemic could occur in any part without being duly noticed.

Secondly, the points of observation are numerous. I find, from a return made by Mr. Baines to the House of Commons, in the year 1853, that there are not less than 3,233 parochial medical officers in England and Wales.

Thirdly, the observers thus occupied are of all men the most fitted for the task. They are stationed in their special localities for great lengths of time ; they are well acquainted with the characters of the localities, with the manners, habits, and diseases of the people ; and, they are, as a general rule, among the most zealous, humane, and educated of the members of the community.

Fourthly, and this is the most important of all, the parochial medical officer, as we know from experience, could make returns of his observations of disease with the least possible labour. He does, in fact, already make these returns, in great part, without any reference to their more extended bearings. In order to supply his board of guardians with correct information on the condition of the poor under his charge, he is furnished with a weekly return-sheet. In this sheet it is his duty to enter the

name, the sex, the age, the residence, and the disease of each of his poor patients. He has, further, to state the days on which he visited the patient, the diet required, and such other general observations as he may think proper.

Having myself made use of these return-books in collecting facts on disease, I can speak with certainty as to their value, even in their present rudely constructed form ; and could these records, as they now exist, be brought together, we might glean from them a large amount of valuable information. But if these 3,233 weekly returns, drawn up for trifling objects, comparatively speaking, were so modified as to become really scientific registers of epidemic diseases, and, if thus modified, they were regularly transmitted to some central authority who could use them for a definite purpose, what truly important tablets of disease they would become. There would then be no disease-registration in the world like that of England.

As regards the forms themselves, it is worthy of remark that in their present state they perform only a temporary purpose. They supply the guardians of unions with information for the week, and are then forgotten. I believe that under any new system, which should require the papers to be sent away after the meeting of the board, a duplicate need scarcely

be retained. Pile upon pile, mouldering away amongst dust and rubbish in the cellars of work-houses, and in the surgeries of medical men, lie what might become the greatest records of disease ever published,—veritable histories, which Government has often sought after at great pains, great cost, and, as yet, with little advantage.

The modifications required in the book supplied by the guardians to their Poor Law medical officers are few and simple. The size of the book would remain the same, but one addition should be made:—upon the inner side of the cover, and on the fly leaf, should be pasted a map of the observer's district, together with a brief description of the geological characters, extent, latitude, longitude, produce, number of towns, population, and the like. These particulars, once drawn out and printed, would remain for many years without any material alteration. At all events, they would give the medical observer no trouble, though rendering his reports infinitely valuable.

The modifications required in the weekly returns themselves are also very few. The columns would remain unaltered. In the columns, however, now set apart merely to express the number of visits paid, another letter or two should be introduced to indicate certain important facts. The V or the X might still

stand to represent the visit ; but the letters D D should be inserted to show the day of commencement of disease, the single D to represent the day of death, the letter C to show when convalescence commenced and R to point out the time of complete recovery, as indicated on next page.

By an extension of the day columns, and by a few cross lines, an arrangement might be formed for recording the meteorological readings of the week ; while the date at the top, as given in present returns, would decide the question of seasons. The last two columns might well remain unchanged. The one for necessaries would show the diet of the patient. The one for general observations would leave room for notes on treatment, hygienic conditions, or other special points, and this column would be better if left rather larger than it now stands in the return-book. In intrusting to medical officers of districts duties so important, a fair scale of remuneration should be adopted, for by this means they would be led to accept the labour as part of the business of their professional life.

This weekly return of disease, immediately after it has served its local purpose, should be despatched to the Metropolis, to be reported upon weekly, after the manner of the reports on the returns sent to the Registrar-General of Births, Marriages, and Deaths.

RETURN AS IT AT PRESENT STANDS.

WEEK ENDING FRIDAY, NOVEMBER 13.

Name	Age	Residence	Parish to which chargeable	Nature of Disease	Days when attended, or when Medicines were furnished							Necessaries ordered to be given to the Patient	Present State or Termination of the Case	Observations
					Sat.	Sun.	Mon.	Tu.	Wed.	Th.	Fri.			
John Williams	10	Chiltern	Chiltern	Scarlet Fever	X	X	X	X	X	X	X	—	Serious	First Case. Imported case

REMODELLED FORM.

Charles Jacob	12	Chiltern	Chiltern	Scarlet Fever	V,DD	V	V	V	V	V	V	D	—	Disease of malignant type. This was a second case, and conveyed clearly by infection. A mild case
Jno. Jones	24	St. George	St. George	Rheumatism	V	V	—	V	V, C	—	—	—	Convalescent Improving	Bronchial symptoms severe. The epidemic has been prevalent during last two months. A mild case
W. Thompson	16	Dunwich.	Dunwich.	Measles	V,DD	V	V	V	V	V	V	V	Nearly well.	The epidemic spreading rapidly
Mary Atkins	36	Dunwich.	Dunwich.	Measles	—	V,DD	V	—	V	—	V	V	Serious	
Thos. Williams	14	Stone	Stone	Influenza	—	—	V,DD	V,DD	V	V	V	V	Serious	
Direction of Wind.					NE.	N.	NW.	N.	N.	N.	N.	NE.		
Ozone					1	0	1	3	1	5	5	5		
Mean Temperature					47°	49°	50°	40°	41°	43°	46°	46°		
Barometer					29.7	29.	29.6	30.	29.8	29.7	29.	29.		
Rain in twenty-four hours (inches)					.004	.012	.010	.007	.000	.000	.000	.002		

I feel it possible that one objection may be made to these records. It may be said that they will not represent the epidemics of a whole population. To this I answer, that the number of cases occurring in any given epidemic is of no importance whatever if the course of the disease be observed over an immense and isolated tract of land, such as England, if its general characters be carefully described, and if the conditions which peculiarly favour its manifestations be accurately pointed out. From three thousand weekly returns, all constructed on the same principles, these and many other facts could not fail to be elicited ; while from the facts themselves, carefully stored up for some years, would eventually be wrought out the historical formula of every epidemic disease.

In conclusion, while I have felt it my duty to bring before the notice of the public the great fact, that in England there exists a registration of disease which, slightly amended and applied, would lead the medical profession to a correct scientific knowledge of the laws by which great pestilences are moved and governed, and, as a result of such knowledge, to the entire removal of these pestilences, I have little hope at present that the reform suggested will be carried out. The question of Poor Law medical relief is in itself so difficult, and so many

obstacles stand in the way of its reform, that we must, I fear, be content for a long time to see three thousand returns of disease thrown away weekly ;—a sacrifice of science, in her noblest efforts, either to political or public apathy.

Meanwhile, the diseases will continue to destroy.

IX.

ON ETHER-DRINKING AND EXTRA-ALCOHOLIC INTOXICATION.

THOSE who like to find excuses for indulgence in the use of alcoholic drinks are apt to argue that the taste for intoxicants is a part of natural man. Some go further and declare that the said part, more clearly than anything else, distinguishes man from the beast. The beast has no taste for strong drink ; the beast never gets drunk of its own will and pleasure ; the beast knows nothing of the enjoyment of the wine cup, of wine that maketh glad the heart of man : therefore, the poor beast is a little lower than man, as man is a little lower than the angels.

It is a pity to break this delusion, but it must be broken. Beasts are not so much lower in intelligence than man that they cannot enjoy wine. Man is not so much above the beast that he alone can enjoy it.

With both man and beast the taste for and enjoyment of alcoholic drinks are mere matters of education.

You can educate either of them to take strong drink, and the world, if it liked the amusement, could train up menageries of drunken beasts that would rival the gin-palaces of Liverpool, Manchester, or London itself.

There is a disease common amongst the hard drinkers of the human family which has gained the common name of 'gin-drinker's liver,' and which the learned members of the Faculty of Medicine call 'cirrhosis of the liver.' The disease consists of an indurated condition of the liver which impedes, and as a rule fatally impedes, the function of that vital organ, with dropsy as a further condition and death in due time, which is not often a long time. Amongst my pathological specimens I have the cirrhotic liver of a cat. This cat was taught by some young children to drink wine. The cat would amuse a company at dessert by taking her share of old port, and by becoming first excited and then very stupid, unsteady, and sleepy. In a few months this feline drunkard became dropsical and soon died. Her liver presented one of the most typical examples of cirrhosis.

When I was conducting my researches on the influence of alcohol on animal temperature, I fed pigeons on peas that had been soaked in a solution of alcohol. At first, as is the case with the human subject; objection was taken by the birds to the

foreign substance in their food, and in a few instances the wiser birds objected to it altogether. But others, so far from objecting, soon acquired a taste for the foreign substance and became decided alcoholics. They quickly were made sleepy, drowsy, and in short diseased animals, but for that they did not care. The alcoholic constitution once pronounced in them, they were fond of the luxury that led to it. If they could have talked to their abstaining fellows, what arguments they might have used! Happily for the world that feeds on pigeons, they could neither talk nor argue alcoholically.

A horse will learn to drink beer. One day, when I was riding in a hired carriage near to Canterbury, the horse stopped short at a wayside public-house. I asked the driver what that was for. 'The horse,' said he, 'always stops here for his beer; he wouldn't go by on no account; you couldn't whip him by, sir, till he has had his beer. His former master taught him to drink beer and invariably treated him to it at this house, and here he'll stop till he gets it.' It was the fact. A large tankard of beer was brought out for that horse, and he disposed of the fluid with as much relish as his master, and then went his way. 'It's a shame,' added the driver, 'but young fellows from London who like a joke, and who also like beer themselves, will sometimes give him a lot and make

him very drunk. Then he is awkward to drive, and bad for two or three days afterwards, and we have to give him more beer to keep him up, which costs a lot.'

In some parts of the country it is the custom still to feed fattening calves with what are called 'gin balls'; a portion of barley flour is made into a paste, and to the paste a measure of gin is added. The gin paste is then made up into rolls and the calves are fed with the rolls much in the same way as the traveller Bruce recorded that the Abyssinian lords were daily fed by their faithful wives. After this refreshing meal the calves are for a short time frisky and wild in the darkened and warm cells in which they are placed to fatten. But before long they go down on their knees, get exceedingly drowsy, and do not move again, nor care for anything, until the next meal comes round. 'They soon take very kindly to gin balls,' a feeder of calves told me. 'They soon like them better than anything else, and the gin keeps them so quiet, that they are fattened up in half the time, in the dark. If we didn't give them gin, they would get restive in the dark and wouldn't get fat.' The moral of this is very effective when we remember how many human beings get ready to die by gin and darkness.

It is a delusion, then, to suppose that all the

pleasures and advantages of the alcoholic existence are confined, by nature, to the higher animal, man. Nature providing for the exercise of free will, lets us learn to partake of what is even foreign to her rule. Man learns to make alcohol and offers it to other men, who take it and like it after they have gone through the nauseous ordeal, which Nature as a warning imposes, of learning to like it. It would be one of the strangest things in all living phenomena if this learning were confined to man. It would be as strange as the special phenomenon of the gift of speech in man, and would really suggest that wine was made for man alone. It happens in this case, however, that the strangeness of the phenomenon in relation to strong drink does not hold good. The lower animals, the cat, the dog, the horse, the calf, the pig, the jackass,—nay even the goat which does not ordinarily drink water,—can learn to enjoy strong drink equally with man.

All-provident Nature, how wonderful is thy beneficence!

If the day should ever come when, under the extending guidance of man, the alcoholic constitution shall be generally introduced into the ranks of the lower animal kingdom, it is difficult to forecast what developmental changes will take place. There will be new races of the lower animals, and breeds inap-

proachable. What shorthorns we shall then have! What a splendid new breed of sheep another Jonas Webb will send to the prize show! What horses will run for the Derby! what hounds pursue the flying Reynard! What trustworthy carrier pigeons there will be! How much more faithfully and steadily the dog will serve his master! What fine pathological cats, dropsical and drowsy, will purr on the hearth-rugs! What butcher's meat will hang up in the shambles! How the lions will roar and the monkeys gabble and chastise their better halves in the Zoological Gardens and travelling menageries! With what skill the buyer of animals will alter his computations so as to estimate his bargains by the shorter life of that which he buys! What modifications of tables the accident insurance offices will introduce by way of increased premiums for all travellers on horseback and by teams on the roads! How delicious it will be to cross footpaths in country fields where the oxen have so much brandy or beer put into their drinking-water to keep them up and make them lively! This truly will not be the day 'when the wolf shall dwell with the lamb, and the leopard shall lie down with the kid, and the calf and the young lion and the fatling together; and a little child shall lead them.' But of what import is that? If it be good that man shall possess himself of the advantages which up to the

present time have only been exceptionally possessed by the beast, why should the beast be deprived of the improvement? It is the duty of man to improve the life standard of every useful thing in life that is under his command. Let him be logical, and extend the improvements inflicted by alcohol, assured that they will be reflected back again to himself a thousandfold in proportion as their goodness is extended to the world of creation beneath his own.

The opinion that no animal save man can enjoy the advantage of indulgence in alcoholic drinks so far disproved, there arises a second opinion, that alcohol is an agent unique in its kind for conferring on man the advantages that are sought from its use. Nothing, it is said, could adequately replace alcohol for the purposes it subserves. Here again we come into contact with another delusion, which, like the former, is maintained only because all the facts are not so generally known as they might be; the truth being, that there are a number of agents which answer all the purposes of alcohol, which are less injurious than alcohol, which are more convenient to take, which, when the taste for them is acquired, are equally pleasant, and some of which produce a much more ethereal and refined intoxication than any wine or other alcoholic drink that is commonly brought to the table.

To the delight arising from the employment of these agents I apply the term, *extra-alcoholic intoxication*.

The alcohol which enters into our common wines, beers, and spirits is called by the chemists ethylic alcohol, or sometimes deutylic. Not many years ago it was unknown that there was any other alcoholic spirit in existence save and except this one alcohol, which could be distilled over from wine and other common fermented drinks. Now we know that there is a large family of the alcohols, each member of which is constructed of precisely the same elements,—viz. : carbon, hydrogen, and oxygen,—with the oxygen element remaining the same, but with the two first-named elements, the carbon and the hydrogen, holding different relative proportions. By accident of discovery the ethylic alcohol, or alcohol of wine, was first brought into use, but all the other alcohols have intoxicating properties, varied only in effect by the difference of their physical qualities, one being lighter and the others heavier than the common and long-known ethylic alcohol. The lightest alcohol, called methyllic or wood spirit, is a quick intoxicant. It may be driven easily into vapour, and the vapour being breathed, men and animals can be made insensible by the mere act of breathing it, just as they can be made insensible or intoxicated by the vapour of

chloroform. Taken in water as a drink, methylic alcohol intoxicates in the same way as the ethylic spirit does, and with the same stages of intoxication.

In accordance, however, with the physical character of methylic alcohol, the action of it in all its stages is less intense than is that of the ethylic alcohol. Four stages of action, one of excitement, a second of excitement with some slight failure of mental and muscular power, a third of failure of both muscular and mental power, and a fourth of complete unconsciousness and of actual prostration,—all these four stages are produced by methylic alcohol when it is taken in sufficient quantity. They are brought about more quickly by it than by the heavier ethylic spirit, and they pass away more quickly when they have been inflicted on the living animal. A good third of time for bringing on action as well as for recovery from action is saved by using the lighter alcohol. Those, moreover, who have learned to drink the lighter alcohol in its pure form acquire a taste for it which is as distinctive as the taste may be for gin or whisky or old port, while, as they tell you, the exhilaration produced is more refined and the after-effect less disagreeable than from other kinds of stimulating drinks.

These are all advantages, the last named, that of the lightness of the after-effect, being the most intel-

ligible. The man who is a drinker of wine and other strong drinks makes it almost a rule, in recommending his own particular favourite drink, not only to praise its goodness while using it, but its comparative harmlessness after it has been used. He knows that even his model liquor cannot possibly be swallowed so as to produce some present effect which he may consider pleasant, without, of a certainty, leaving some after-effect which requires to be apologised for. Of such disagreeables his model causes or produces the least number and the least demonstrative ; therefore it is the best. It does not give headache like brandy, heartburn like gin, giddiness and spots before the eyes like whisky, gout or gouty rheumatism like old port, acidity like claret or cider, or drowsiness and stupor like beer. It does something perchance, but nothing that a man need be pitied for enduring ; therefore it is the best. One of my friends always drinks champagne. He does not like champagne so much as he likes madeira or rich port, and he does not think it so 'sustaining' as either of those two wines ; but then it never provokes a decided fit of dyspeptic gout, never lays him up for two or three days, as those fine old wines invariably do. It produces just a little flatulency, and now and then a slight squeamishness and giddiness, but nothing more. For these reasons he holds by champagne as

the wine which, on the whole, suits him best, or does him the least harm. He is a wiser man than many, but not the wisest. The few who drink the pure methylic alcohol hold the same ideas in respect to their model intoxicant, and in so far as their reasoning applies, at all reasonably, they are correct in what they say. Methylic alcohol, lighter than ethylic, causes a quicker sensation of what is thought to be pleasure, and for the same reason its action is more speedily over. In plain words, it escapes from the body affected by it more easily, in which particular it has a decided advantage over all the other members of its family as an agent to be used by the members of the human family for their delectation.

Up to this time methylic alcohol has not been so much used as one would suppose it might have been. The specimens of it in the market are, as a rule, so impure that there has been a prejudice against it. Yet I have met with those who would drink, with relish, even the impure sort, after a little training in drinking it, when it was made sweet and was diluted with water. One person with whose history I am acquainted took the pure methylic spirit whenever he could get it, and looked upon it as nectar compared with the coarser spirits on which other and less refined mortals were foolish enough to stake their indulgences.

If common ethylic alcohol be treated with strong sulphuric acid,—the oil of vitriol of the ancient chemists,—there is formed a light fluid, which distils over, and which, because of its extreme lightness, has been called ‘ether.’ Pure anhydrous ether, that is to say ether from which all traces of water have been removed, is one of the lightest fluids known. Its weight is 720 as compared with water as 1,000. If into the palm of the hand a little of it be poured, it begins to bubble with great rapidity, for it boils and passes into vapour at 94° Fahr., that is, at four degrees of heat lower than the temperature of the natural body. It is much less soluble than the two soluble alcohols which we have had under consideration. One part of it only will fairly dissolve in twelve parts of cold water. It has a taste which is very peculiar, and which, to the uninitiated in its use, is certainly not pleasant.

Any one of the members of the alcohol family, if heated with strong acid, will yield an ether; but different alcohols yield different ethers, according to their kind. The light methylic alcohol yields methylic ether, which under ordinary conditions exists only in the state of a gas, but which is compressible into a liquid. Ethylic alcohol yields the ordinary ether of commerce. The heavier alcohols yield heavier and very potent ethers, the action of some of which I have studied, but which do not concern us at

the present time. Our business is with the two lightest ethers,—the methylic and the ethylic.

The action of the common ethylic ether on man has been carefully studied on the largest scale, owing to the circumstance that it is the fluid used, by the inhalation of its vapour, for the production of insensibility to pain during the performance of surgical operations. The action of the lighter methylic ether has been a subject of special study by myself, and I have reported on it to the British Association for the Advancement of Science. As an ether it is the best and safest of all the anæsthetics, but it is not readily applicable, since it exists only in the gaseous state under the ordinary atmospheric pressure.

When either the methylic ethereal gas, or the ethylic ethereal vapour, is taken into the lungs by inhalation, the effect produced is exceedingly rapid; a full degree of intoxication, with utter unconsciousness and prostration, being producible in a few minutes of time. Still, rapid as the changes induced are, there are presented to the skilled observer four definite degrees or stages of action. (*a*) A stage of excitement; (*b*) of excitement with some confusion of ideas, and imperfect muscular control; (*c*) of loss of mental and muscular control and power; (*d*) of complete loss of consciousness, with entire muscular prostration.

By skill and practice in attaining the art, the fluid ethylic ether, or a mixture of methylic ether dissolved in ethylic ether, can be swallowed as alcohol is swallowed. The art of swallowing it consists in getting such a light and gaseous body down the throat. The feat can be accomplished by the assistance of cold water as an aid to swallowing, and the ether can thus be actually introduced into the human stomach. Once in the body, the ether is taken up by the blood, in the same way as if it had been inhaled by the lungs, but not with such rapidity. Once in the blood, it makes its way over all parts, and produces effects the same in relation to degrees or stages of intoxication as alcohol does.

Ethylic ether has been known to the scientific world for many centuries, and it has performed some of the most useful of purposes to mankind. It was by the discovery of its property of producing insensibility when its vapour is inhaled, that the grand re-discovery of the process of general anæsthesia was made in the present century. It was by taking advantage of the comparative insolubility of ether, and its low boiling point, that I, some years ago, was able to introduce the process of ether spray for local anæsthesia by cold.

In a world given to treating itself with intoxicants as if they were necessities of the living existence, it

could hardly escape realisation that so potent an intoxicant as ether should be thought of and applied for purposes of intoxication. Very soon after ether began to be used for the relief of pain, it became known that some persons indulged in its daily use. One of the first men I knew who tried it experimentally for the purpose of scientific research, took a liking to the ecstatic condition caused by it, and inhaled the vapour of it as regularly as he imbibed his nightly draught of whisky toddy.

This practice, however, did not gain ground in a general way, and for many years after the discovery of the anæsthetic properties of ether it was little heard of. Inhalation of vapour of ether as a mode of habitual intoxication has, in fact, never been generally adopted.

But in another and singular manner the process of taking ether for the object of causing the different stages of intoxication has been established in one part of this kingdom, and has attained such a degree of extension, locally, as to demand public attention. The process consists in drinking the ether, and the phenomena produced by the indulgence in ether-drinking are very remarkable.

When I was travelling in Ireland last year I was first told the history I am about to relate. I was informed in various towns in Ireland,—in Dublin, in

Cork, in Waterford, in Ballymena, in Belfast, and in Coleraine,—that in certain districts of the North of Ireland there was a widespread custom of ether-drinking, and that it behoved me to go and inquire into the subject, the scientific as well as the social bearings of it being singularly important. It was a curious circumstance, but one of many similar, showing how very little the people of Ireland travel about in their own lovely island, that, although many persons could give me second-hand information of the practice of ether-drinking, I could not find a single person who could tell me a word about it from direct personal study or observation. At a place where I was dining with a rather large party of friends, I was told by one of the company that a friend of his had visited a village in the 'mountains of the North,' where the people drank ether as other people drink whisky, and that the odour of the ether was sometimes so pervading it could be detected at the distance of half a mile from the village. The story created a good laugh, in which I rather rashly joined. I specially wished to see and interrogate the visitor to the mountains who had observed so strange a phenomenon, but he had left the town, and I was unable to see him. For some days I received accounts of these ether-drinkers with, I must confess, a considerable doubt of mind, yet only to have the fact of their

existence again and again enforced upon me. Thereupon I determined to go and see for myself, though not without suspicions, even when I started, that I should find my journey somewhat like a journey that is now and then made, to no satisfactory purpose, on the morning of the first of April.

I was directed particularly to Draperstown, 'a village in the mountains of the North,' and accordingly I went there from Ballymena. I passed along the line towards Belfast, until I reached a junction where there was a branch line to Magherafelt, a very pretty market town, a few miles from Draperstown. On inquiry I found that the ether-drinking practice was not much known in Magherafelt itself, but that round about there were 'ether-drinkers,' and that at Draperstown there were plenty of them. We must have a car,—I say *we*, because my son accompanied me,—and away to Draperstown. As we journeyed we were taken, or rather mistaken, for two of the members of the Drapers' Company, on a visit to look after our 'nate little property in the mountains,' and we could not remove the impression, though we did not wish to pass for what we were not. For some reason, which I could not get at, I was believed to be the solicitor to that respectable company, and as such I was carried away in a rough 'jaunting' car, drawn by a skeleton of a horse that could go like the wind when

guided by a driver who was as silent as the grave in which, I am sure, that skeleton of a horse must by this time be taking its rest. In my life I have never enjoyed such a drive of beauty as from Magherafelt to Draperstown. For the first mile or two the road is simple enough, up hill and down, with side fences and fields, and no extensive view. But soon we emerge into a very basin of light ; not into a valley, but into a huge plain, with hills, or, as the natives say, 'mountains' all around us. The mountains, blue in the distance as the bluest sea, shade away into filmy clouds, which, dark in their centres, and tipped at their edges with silvery white, look like monster seagulls floating for a time around the tops of the mountains or from one mountain to another, and then dissolving away. Yet these blue mountains, when you come to them, are seen to be richly cultivated to their highest parts, and their blue colour, as the approach to them draws near, shades into the practical green. In the various movements of the changing shades I forgot for a moment all about ether except the ethereal blue, all about drinkers of every kind except those who can drink in the beauties of Nature. I almost clapped my hands in my delight. Even that silent driver of the skeleton horse seemed for a moment to catch the enthusiasm, for when I pointed out the exquisite greenness of a mountain side he remarked obviously

afraid of admitting so much to the ogre of a solicitor to the Drapers' Company, 'that green shure enough was the colour of Ould Ireland ;' after which he subsided for ten minutes at least, and only resumed the conversation to ask me whether when we steamed from Holyhead to Ireland I observed in the distance 'Ireland's oye.' A brisk drive across this plain in the mountains brought us to an ascent, and once more along shaded lanes until we came to a plateau ; then down into a valley not very deep, and up again to another plateau ; and so near to our journey's end. On our right, from beneath us, as if from a hollow, rose a body of light blue smoke. 'That is the smoke from Draperstown,' said the driver. A little farther on we saw the tops of the houses, and a red flag floating on a high pole or mast. 'That's the doctor's flag,' remarked the driver ; 'the doctor keeps a flag, and he often flies it.'

The wind was not in the right direction as we entered the town, so we did not smell ether. Soon we passed a neat hotel on our right hand, and then, turning sharply to the left, we were at the upper end of the town.

We had gathered, from the stories that had been told to us about this 'village of the mountains,' that it was a rude and straggling place. Instead of this, we found it, to our pleasant surprise, to be one of the

prettiest places in the three kingdoms. The row of houses and buildings on the right hand, which look down on a lower part of the village, are good handsome structures. Before them is an open space of large size, like a big square, exquisitely neat and clean, and beyond the square the lower town, with a fine open street leading up a hill into the country, or, as the usual expression is, 'into the mountains,' on the other side. In the town are some large public buildings ; and the parish church which lies a shade apart on the right, as we stand above looking towards the lower town, is a fine old edifice.

A small market was being held on the day of my visit, and people were very busy and agreeable. They were all neatly dressed and well-to-do. The cars of those who were from the country were waiting for their owners, comfortable and well-fitted cars drawn by first-rate cattle. Making my way to the lower part of the town, where the business was being carried on, sure enough there was the enemy. As certainly as if I had been in the sick-room using ether-spray for an operation, there, in the open space, came over to me the odour of ether. Amongst the people who were buying and selling the odour was prevailing. At the door of a house where ether could be bought the odour was as distinct as from an open flask containing ether. Passing along so that the

wind brought the vapour from the lower part of the town, I easily traced the odour of the vapour several hundred yards, and the statement of the gentleman who had detected it half a mile from the town recurred to me as one which ought not to have been laughed at as it was, without any doubt, strictly true.

I was fortunate in carrying with me an introduction which enabled me to obtain the precise information I wanted and which confirmed to the full the fact of the existence of the habit of ether-drinking in Draperstown and the adjoining district. My informants knew when the custom commenced, and had observed the results of it with the most careful watchfulness. But for this I might have made my journey in vain, for the habit is not proclaimed from the house-tops, and recently, owing to the influence of the Catholic clergy, which influence is strongly used against it, the habit is unpopular. Those who indulge in it are either silent in respect to it, or annoyed if they be questioned in reference to it.

There have been several theories started as to the origin of this practice of ether-drinking. That which comes nearest to the truth, as far as I could make out, is to the following effect.

During the temperance mission of the illustrious Father Mathew, that useful social labourer visited the North of Ireland, and in the course of his labours was

so successful in the districts to which I am now referring, that practically he brought the whole of the people over from hard whisky-drinking to total abstinence from alcohol. The change was a social revolution for good ; and has been effective for good up to the present hour, though numbers of those who took the pledge from the Father have died, and though no one like him has roused the younger generation to the same enthusiastic zeal for temperance. Father Mathew converted the district to his views. He may be said, in a certain sense, to have converted Ireland, for he lighted a fire which has never died out. But this particular district he converted most effectually. After his visit the whisky bottle and the still fell out of favour altogether, with the most evident signs of improving social progress and happiness. Unfortunately, one day some cunning diabolical spirit brought into Draperstown the ether bottle. 'This,' said he, 'contains no whisky, nor anything that will do you harm ; but a new drink, which you may taste without, in any degree, breaking your pledge. Very little of it, not much more than a thimbleful, is required to cheer your spirits.' 'The new drink' was thereupon introduced, and has been in operation ever since. It got its introduction about the year 1846-7, and for thirteen years, at least, it was sold freely. It was never, I believe, sold regularly at spirit stores, or

if it were sold, the sale was concealed. A glass of 'the new drink' might be permitted to oblige a customer, but the spirit-seller did not make a trade of it, partly, perhaps, because the sale of it was opposed to his interests, and partly because it might have led to the unpleasant interference of excise officers, who could not truly have objected to the sale of the ether, since it was all made from methylated spirit, which is exempted from duty, but who might nevertheless have become very troublesome if, on pretext of inquiry into the sale of 'the new drink,' they had looked into other details which enter into the business of the most respectable seller of older liquors.

As a result, the sale of ether was confined almost exclusively, as it still is, to the shops of the grocer and of other small retailers. I was shown two or three of these shops as the chief depôts where the article is obtainable.

The customer who is given to enliven himself with ether swallows his draught, commonly, at the place of sale, though some take the drink home. There is an art in swallowing the ether. The drinker first washes out his mouth with water 'to cool it;' next he swallows a little water to cool his throat; then he tosses down the glass of ether; finally, he closes in with another draught of water to keep the ether from rising, or, in other words, to cool his stomach, so that

the volatile ether may not be lost by eructation of its vapour. In a little time the 'trick' is easily acquired by members of both sexes.

The quantity of ether taken at a draught varies with different persons. Mr. H. Napier Draper, who has favoured me with two excellent papers on this subject, which he has published in the 'Medical Press,' gives from two to four fluid drachms, that is, a quarter of an ounce to half an ounce, as the usual quantity. Before I personally inquired into the question I should have considered the quantity of half an ounce as a dose of ether impossibly large to swallow at once. I am convinced, however, now, that it is an understatement of the usual dose. A confirmed ether-drinker will toss off a wineglassful of the 'new drink' and not be afraid, and a full-sized wine-glass will hold three fluid ounces. It is not all who indulge to this extent, but few take less than half an ounce who take any at all; and from half an ounce to three ounces may be put down as the range of potation. Compared with the quantity that can be administered by inhalation this amount is not singular as an amount. The singular part is that so much can be taken in the form of drink and not be rejected by the stomach.

The ether that is thus imbibed is not actually the pure ethylic ether. It is made from what is com-

monly known as methylated spirit,—the spirit which is used ordinarily for lamps and other every-day purposes. Methylated spirit is a mixture of ordinary spirit with impure wood spirit, that is, methylic alcohol which has not been carefully distilled, and which in this impure state has combined with it some pyroligneous compounds, small in quantity but very nauseous to the taste. The impure mixture being free of duty, the ether-makers or importers of Belfast and Dublin, who supply the north of Ireland with ‘the new drink,’ are enabled to supply it cheaply, namely, at from one shilling and threepence a fluid pint, about five times less than the cost of pure ethylic ether as we buy it ‘retail’ in London.

Mr. Draper very clearly points out that if the ether had not been marketable at the price paid for it in the ether-drinking districts it could never have been introduced as a new stimulating drink. Estimating the consumption of the ether at four thousand gallons annually, he shows that if whisky were taken in the same proportion the excise return from it would amount to 5,666*l.* per annum. The excise authorities are in this way deprived of a considerable income, presuming always that the equivalent of whisky would be taken if ether were not taken. For my part, I do not think that whisky would be taken in substitution to the full extent, but more in all

probability would be at this time, when the original effect of the temperance pledge is dying out. The result, in the long run, does not affect the wealth of the community.' If more whisky were taken and more excise duty paid, there would be more than corresponding injury inflicted by poverty, loss of useful labour, and increase of crime.

We may now turn to the physical effects of ether-drinking on the life of the drinkers.

It will be gathered from what has been written, that the ether which is consumed is a mixture of ethers and of some other organic substances. It contains two ethers, some of the light methylic ether dissolved in the heavier or ethylic ether; a little ethylic alcohol which has not been separated in distillation, and some organic odorous compounds, or pyroligneous impurities which have also distilled over in the process of manufacture. This impure ether compound does not boil in the hand, as the best ethylic ether does; it requires a temperature of 108° F. for its perfect boiling until it is all dissipated. It dissolves in water more readily than the purer specimens; one ounce of it will dissolve in eight and a half ounces of cold water,—water at 50° Fahr. In considering the ether which the drinkers imbibe, we have then a compound of two ethers, a little alcohol, and the trace of hydro-carbons which gives the

peculiar odour. But I learned that the effects of the fluid are due to the two ethers, methylic and ethylic.

I have already indicated what is the action of these ethers on the body of a living man or animal when their vapours are inhaled by the lungs. The same effects generally are induced when the ethers are swallowed into the stomach of the ether-drinker. The swallowing of a draught of from three to four fluid drachms is followed by quick excitement, flushing of the face, rapidity of the pulse, elevation of the mind, and rapid unsteady motion of the body. The same first and second stages of alcoholic excitement that are caused by wine are developed by the ether, but so rapidly, and running so sharply the one into the other, that the two stages, which are so very distinct in the process of alcoholic intoxication, become hard to distinguish. In these stages the ether-drinker is, as a rule, loquacious and 'free of his mind,' as one observer very tersely explained to me. 'He is free of his mind and sometimes shows his teeth, but, generally, laughter like that of a person in hysterics is the sign of ether-drinking.' The pugnacious are often inclined to fight in these stages, and if they do fight, they seem strong, and struggle a good deal, but without much sense or judgment. In these respects, again, the ether-drinker resembles the touchy alcoholic during the first stages of his mania.

There is, however, a great difference between the action of alcohol and ether in another respect. Alcohol, steady in its action, soluble and slow of elimination, clings to its man, holds by him, keeps up his excitement a long time and leaves him depressed, melancholic, weary. Ether, on the other hand, rapid in its action, feebly soluble in the blood, quick in being eliminated, escaping in fact by all the emunctories,—by the skin, the lungs, the kidneys,—speedily releases its victim, and, without causing any great strain on his physical powers, leaves him suddenly a sober if not a wiser man. They tell a story in the ether-drinking districts of a stranger coming to visit his brother, and asking his brother, who was suddenly roused into a state of great elevation by a large dose of ether, what nonsense that was! ‘Nonsense!’ stammered the ether-inebriate, in self-admiration; ‘what do you think of being got up to this for three-pence?’ After which admiration, he seasoned down to his rational state, and was soon himself again.

The greater part of those who indulge in ether as a drink are content to stop at the first two stages of intoxication: but some go further, and, passing into a third stage, become at first extremely violent, and after a while quite insensible. They fall dead drunk, lie breathing heavily for half an hour or more, and afterwards wake suddenly quite sober. A few exceed

this extreme limit and indulge in a poisonous measure. Dr. Morewood, of Draperstown, who gave me a most careful description of the symptoms produced, told me that a short time before my visit he was called to a man who had taken a large dose of ether, probably after having also taken some whisky, and who suddenly fell and ceased to breathe. Before Dr. Morewood reached this man he was dead. In three other instances in Dr. Morewood's practice an all but fatal result followed the taking of a large dose of ether, but by artificial respiration the life was sustained until the ether had time to eliminate from the body; recovery thereupon occurred, but the danger was deathly imminent. Mr. Draper, in his paper, refers to a case in which the vapour of ether, in the breath of an ether-drinker, caught fire. The drinker, in this instance, was reported to be always taking ether, when one day, after swallowing a quantity, he went to light his pipe, and the fire caught his breath. A person near held the burning man down, and poured water quickly into his mouth, by which the flame was put out, and no great harm was done. I did not hear of this escapade myself while in the district, but I have no reason to doubt its truth. A medical friend of mine who was using ether spray to extract a tooth late at night, unwittingly brought a lighted candle to the mouth of the patient to examine

if the whole of the offending molar had been removed. To the operator's dismay, as the patient exhaled a breath of air from his lungs charged with vapour of ether, the vapour caught fire, and but for prompt attention a serious accident might have resulted. As it was, great alarm and some superficial burning of the lips were experienced by the sufferer.

I gathered from my inquiries that, taken as a whole, the symptoms of intoxication caused by ether-drinking are identical with those produced by alcohol, but are of slighter duration. From the flushing and surface warmth of the first stage of intoxication to the pallor and surface-coldness of the last stage, all is the same. I learned also that the taste for ether-drinking is speedily acquired, and that when it is acquired the craving for ether is as strong as ever it could be for alcohol.

It will occur to the reader, perchance, that the action of ether on the animal body is more deplorable than the action of alcohol, and that for the benefit of the sufferers from ether-drinking the practice ought, if that were possible, to be put down with a firm hand. I should quite agree as to the suppression of the practice; but I am bound at the same time to state the truth, that ether intoxication is actually far less injurious, socially, morally, and physically, than is the alcoholic intoxication.

In the first place, the ether-drinker, as he comes more readily under the influence of his indulgence, is the sooner rendered incapable of continuing the indulgence. He falls before he is hurt and before he has much time to hurt others. For a few minutes he does, or, more correctly speaking, he may become a savage, but he never becomes a sot, existing for hours at a time, or even for days, a helpless, morose dog, unable to help himself and determined to help no one else, however rightfully they may claim his assistance. Neither while he is a savage does he retain for any long period the power of doing mischief. His violence of temper is brief and is mingled with outbursts of crying or laughing, like the wildness of the hysterical rather than the furiousness of the mad. Indeed, the intoxication produced by ether may be compared to alcoholic intoxication, as the hysterical representations of some diseases are comparable to the same diseases in their reality. The fury of the ether aberration is therefore fitful, and, better still, it is short. It is a volatile fury, volatile as the fluid which produced it. When a man is raging from strong and fiery alcoholic drink he wanders about, often for hours, exercising a kind of reasoning unreason, irrepressible in what he does as a whole, yet with flashes of directing reason which lead him to carry out evil acts and purposes with a design, skill, and intention which to the by-

stander may look in every particular like intelligent purpose, but which the drunkard is really doing without being himself fairly conscious, and which when he has become sober he has utterly and absolutely forgotten, if it can be said that what he did was ever implanted on his memory. For a moment the ether-drinker may imitate the alcoholic in some of these respects, but it is only for a moment. Before he has time to plan and carry out his miserable scheme he is liberated from the devil that possesses him, or at the worst falls, for a season, into complete insensibility, harmless, unconscious, and ready soon to return to the realities of life, sober and in his right mind.

I was specially anxious to ascertain whether under the influence of ether-intoxication crimes of violence extreme, prolonged and plotted, were carried out, in the affected districts. I could hear of none such. I heard of blows being struck during the short fury, and of foolish things that were half said and done ; but the description was tempered by the explanation that under excitement from ether there was no time for continued violence nor for the carrying out of matured designs of an evil kind. This experience tallies precisely with that which I have learned in observing the effects of the administration of ether vapour on men and on animals. When ether was originally

introduced as an anæsthetic, and the medical students, to the great body of which much maligned class I had then the honour to belong, were busy making experiments of administration on themselves, many amusing and short struggles occurred. Nor were the same scenes altogether confined to the students. I remember a grave assembly of learned doctors, with the gravest of its grave in the chair, losing its equanimity. An American student, short, powerful, and excitable, who was made the subject of experiment of ether-intoxication, rose during the stage of his excitement, and after bursting from his captors, and giving, with an eloquence remarkable for its passion and a candour equally remarkable for its completeness, the prevailing student views as to the various professorial and moral qualities of his teachers, finished off by going up to the grave and astounded president, to astound him still more by a deliberate double box on the ears which for many a long day was solemnly remembered. But the excitement was over in a few minutes, in minutes as compared with hours had alcohol been the exciting agent instead of ether.

In the next place, it must be admitted that, as a rule, the dream of the ether-drinker, while he is under the spell of his enchantress, is far more refined and light than the dream of the alcoholic, as that is usually

described by those who have felt it. Sir Humphry Davy, in his memorable, perfect and original work on nitrous oxide or laughing gas, strikes a contrast between the action of that gas and of alcohol on mind and body. For the sake of experiment, Sir Humphry subjected himself systematically to an intoxicating draught of alcohol. He drank a bottle of wine in large draughts in less than eight minutes. Whilst he was drinking he felt a sense of fulness in his head with throbbing of the arteries. After he had taken all the wine the sense of fulness in the head remained, objects around him became dazzling, the power of distinct articulation was lost, and he was unable to walk steadily. At this moment his sensations were rather pleasurable than otherwise; the sense of fulness in the head soon, however, increased so as to become painful, and in less than an hour he had lapsed into a state of insensibility, in which situation he remained for two hours or two hours and a half. He was awakened by headache and painful nausea. The nausea continued even after the contents of the stomach had been ejected. The pain in the head every minute increased; he was neither feverish nor thirsty: his bodily and mental debility were excessive, and his pulse was feeble and quick.

In most precise terms the acute effects from alcohol are here faithfully depicted by one of the

finest observers of natural phenomena. The description reads in a still more striking form when it is compared with that of an intoxication produced by nitrous oxide gas in the same observer.

The description of the intoxication from nitrous oxide is taken again from a direct experimental and personal observation. Sir Humphry breathed nitrous oxide for a long time in a closed chamber, and felt some effects, which he has chronicled ; but it was not until afterwards that the full realisation of his new life was experienced. After leaving his 'box' in which he had been breathing the gas, he began to respire twenty quarts of the pure gas, and thereupon the change of life began. He felt a sense of tangible extension in every limb ; his visible impressions were dazzling and apparently magnified ; he heard distinctly every sound in the room, and was perfectly aware of his situation. By degrees, as the pleasurable sensations increased, he lost all connection with external things : trains of vivid visible images rapidly passed through his mind, and were connected with words in such a manner as to produce perceptions perfectly novel. He existed in a world of newly connected and newly modified ideas. He theorised ; he imagined that he made discoveries. When he was awakened from his semi-delirious trance by his friend Dr. Kinglake, who took the inhaling bag from his

mouth, indignation and pride were the first feelings produced by the sight of the persons about him. His emotions were enthusiastic and sublime, and for a minute he walked round the room perfectly regardless of what was said to him. As he recovered his former state of mind, he felt an inclination to communicate the discoveries he had made during the experiment. He endeavoured to recall the ideas, but they were feeble and indistinct: one collection of terms, however, presented itself, and, with the most intense belief and prophetic manner, he exclaimed to Dr. Kinglake, '*Nothing exists but thoughts! the universe is composed of impressions, ideas, pleasures and pains!*'

In this narrative we have a description of an intoxication refined to the extremest degree, from which recovery was rapid, with pleasurable sensations. It too is an intoxication the habit of which is easily acquired and craved after.

Sir Humphry Davy was a strong-minded man, by nature brave, resolute, wise, self-sacrificing. Yet, after he had become somewhat habituated to the taking of nitrous oxide for experiment's sake, he was led to make confession that 'a desire to breathe the gas was always awakened in him by the sight of a person breathing, or even by that of an air-bag or gasholder.'

Methylic and ethylic ethers produce effects which contrast with alcohol and compare with nitrous oxide.

Methylic ether when inhaled is to my mind more pleasurable in action than nitrous oxide. I experience a sense of suffocation from nitrous oxide which I do not from methylic ether; and certainly I can never forget the dream which once followed upon inhalation, not to complete but to all but complete insensibility, of methylic ether gas. It seemed to me as I came under the influence that periods of time were extended illimitably. It seemed to me that the space of the small room in which I sat was extended into a space that could not be measured and yet could be grasped and threaded; as if my powers, mental and physical, adapted themselves, for the moment, to the vastness of the space. It seemed to me that every sense was exalted in perceptive appreciation. The light was brilliant beyond expression, yet not oppressive; the ticking of a clock was like a musical clang from a cymbal with an echo; and, things touched felt as if some interposing gentle current moved between them and the fingers. When the inhalation ceased at my own instance,—for as my friend, the late Mr. Peter Marshall of Bedford Square, who was present, told me, I was sufficiently conscious to know when I had breathed long enough,—when the inhalation ceased, the return to the natural state of existence was imperceptibly rapid. As in a dissolving view, I seemed to pass from one state into another by a solution of states; the dreams faded gradually, giving

way to the realities of the present, so that for an instant I had to ask which was real and which was unreal, until the mind was steadied and was once again fixed in its old abode. They who have felt this condition, who have lived, as it were, in another life, however transitorily, are easily led to declare with Davy that 'Nothing exists but thoughts! the universe is composed of impressions, ideas, pleasures and pains!' I believe it is so, and that we might by scientific art, and there is such an art, learn to live altogether in a new sphere of impressions, ideas, pleasures and pains. But stay: I am anticipating, unconsciously, something else that is in my mind. The rest is silence. I must return to the world in which we now live and which we all know.

The action of ethylic ether is in some degree similar to that of nitrous oxide and methylic ether, but in a grosser sense. The dream is not so refined, the insensibility is more prolonged after the fluid ceases to be received by the body, and in every stage the state produced more closely resembles that produced by alcohol. Sometimes, indeed, nausea and even vomiting follow on the effect of the ether after the consciousness has been restored. In plain terms, we have in ethylic ether a heavier substance than we have in the two gases. The nitrous oxide gas and methylic ether are eliminated from the body in the same form as they enter it, as gases. Ethylic ether,

condensable in the body into its fluid form, is less rapid in its diffusion and is less easy of extrication from the body. It passes all away as ether, leaving the body free of its presence without combining with any of the tissues, or more than temporarily interfering with the functions of the vital organs ; but, as the prolonged odour of it in the breaths of those who have taken it shows, it clings longer than its subtler allies do to the body.

The person under ethylic ether has often a furious dream, or a foolish dream, or a perturbed sleep of the dreams of which he remembers little or nothing when he re-enters the world. He very rarely experiences ecstasy even when he takes ether that is perfectly pure.

The ether-drinkers who imbibe an impure ether, a mixture of methylic and ethylic ethers with a trace of alcohol, and with a trace of the hydrocarbons which are so unpleasant to smell and taste, experience a rapid but not ecstatic intoxication. I have shown already how this intoxication differs, objectively and subjectively, from the alcoholic intoxication in those who take ether by inhalation. I have shown that it causes an intense drunkenness so sharply that the four stages can hardly be individualised, and so short that recovery is all but immediate. Ether has this luxurious advantage over alcohol as an intoxicant

that under it a man may get intoxicated and sober some half-dozen times in the twenty-four hours, and may start off again for the next twenty-four, suffering less than he would suffer from one intoxication, equally deep, induced by alcohol. There are persons in the ether-drinking districts who really consider this to be an advantage, an advantage all the greater because the process is not only brighter and sharper, but very much cheaper. A good threepennyworth of ether is a perfectly satisfactory quantity for one luxurious intoxication. The economy of ether-drinking, by those who like it, needs no further exposition.

There is one more advantage from ether-bibbing over wine and spirit-bibbing, which is most important of all. Men and women who steadily indulge in the use of alcoholic drinks quickly and certainly attain one or other stage of the 'alcoholic constitution.' They may call themselves moderate drinkers, but as soon as ever they begin to feel that alcohol is a necessity and that they cannot abandon it without a struggle, they are under its ban, and are to some extent physically impaired by it. Their blood-vessels are easily congested ; their digestion is readily deranged ; their spirits are quickly depressed ; their muscular power is rapidly prostrated ; and, they grow, almost without exception, prematurely old, dying in the early years of the third term of life, that is to say, soon

after sixty, from kidney disease, heart disease, lung disease, brain disease, or some other of the degenerations of the vital tissues, which in healthier persons need not appear until the closing part of the fourth term, that is to say, until between eighty and ninety years, according to the present perfect fulfilment of human life.

The ether-drinkers are not subjected to this same strain. Mr. Draper reports that he has heard of some whose minds have become affected under ether after long and free indulgence in it, and he also refers to an example of supposed loss of sight from the same cause. I am unable to confirm these rumours. I do not think anyone could have had a better authority on the subject than I was favoured with, and the testimony I received, drawn from a skilled experience and observation of twenty-five years, was, that in ether-drinking districts the dangers induced by ether are invariably the dangers incident to a sudden overdose of the agent. The special organic diseases of the body, some of which so invariably follow upon the continued taking of alcohol, such as gout, fatty degeneration, discolorisation of skin, cirrhosis, phthisis, albuminuria, general or local paralysis,—these, and other conditions of disease, different as affecting different organs, but similar in respect to producing modification of vital function, and all inducible from alcohol, are not induced by ether. It is true that

some few ether-drinkers are affected by these diseases as if they derived them from the practice of indulging in that fluid ; but on inquiry it is always found that the indulgence in ether is combined, in these examples, with indulgence also in some form of alcoholic drink, usually in whisky.

The worst physical evils which seem to attend indulgence in ether-drinking are dyspepsia and excitability of mind, producing, in combination, a condition closely resembling true hysteria. When the short intoxication from ether is over, the person who has suffered from it is subject to flatulency, to depression and inactivity, and to hysterical disturbances, for which the remedy, too frequently sought, is another draught of the ether itself, by which the craving for it is much intensified.

The practical experience thus related is fully explained by the physiological readings of the action of ether, and is confirmed by them to the letter. A fluid so comparatively insoluble in the blood and other animal fluids, as ether is, is comparatively negative in its action. It enters into no durable physical combination with any part or structure : it undergoes no chemical decomposition in the body : volatile as well as insoluble, it is easily liberated from the body ; and, after a short time, it leaves the body without infliction of permanent injury.

We know, however, that it is a part of the physiological action of ether to disturb the stomach even when it has been administered by the process of inhalation ; and we know further that in some persons it leaves hysterical nervous states which may, after one prolonged inhalation, remain for several hours. In the case of the experimentalist of whom I have spoken, who learned the habit of inhaling the vapour of ether daily, this hysterical commotion was a marked attendant symptom, and was urged, as is so commonly the case, as a reason for continuing the practice, because of the relief which was so immediately afforded by a few breaths of ether. The same reason, in nearly every instance, is assigned for the use of alcohol by the alcoholic community. The alcohol keeps up a constant malaise, which nothing so effectually removes, at a moment's notice, as alcohol. Thus the vicious circle of evil is continued in fatal operation.

Taking it all in all, the history of the ether-drinker compares favourably with that of the alcoholic. We are so accustomed to witness the action of alcohol in our daily life ; we see so many thousands making the physiological experiment of its use ; we hear so constantly the story of its effects ; we have grown up so familiar with the praise of its virtues, and so callous, if not ignorant, of the reality of its vices ; we

are so imbued with the idea of its necessity, and so ignorant of the fact of its being no necessity at all until it makes the necessity for itself; we are so impressed with the favoured protection it affords, and so blinded to the open secret of the incalculable danger it is ever imposing on the world; we are so disposed towards alcohol in all these points,—that when we hear of a practice of indulgence in some new intoxicant we are led to pity the wretches who are so deluded as to resort to that which seems to us so unnatural.

I doubt not most alcoholic tasters will pity and criticise the ether-drinkers of the north of Ireland. I dare say they will feel that the good priests of those parts are performing a noble work in their endeavours, which are incessant, to exclude the ether bottle from their parishes. With that sentiment I as candidly concur. I rejoice to hear and to know that the efforts of the priests are being successfully rewarded. If, however, by these efforts the whisky bottle begins again to replace the ether bottle; if, instead of indulging in the light delirium of ether, the converts are to resort to the heavy delirium of alcohol, then the conversion will be simply from one evil back to another evil that is greater and more inflicting in its sins and its penalties both to the individual and to the community. I mean that in proportion to the

physiological wrong done by the agent used, the physical and moral wrongs will multiply and increase.

Let not this view, however, be accepted as an apology for ether-drinking, or as an excuse for it. It is a bad practice, though there may be others that are worse. The ether-drinker is recurrently an irrational being incapable of perfect trust, and in so far as his indulgence is gratified, is demoralised. He also is exposed to personal danger, for the dose that proves fatal is easily reached, and if he were to become the representative of the millions of society, sudden death from ether would be an every-day phenomenon.

The grand object of the true reformer should be to suppress all sources of physiological wrong,—the lighter as well as the heavier, the whisky bottle and the ether bottle, and all other similar bottles that lead to similar physical and moral inaptitudes for moral and healthy life,—with equal promptitude and decision.

I showed at the opening of this address that the lower animals can be taught to drink alcohol, and not only to drink it, but in time to crave for it, and to take it preferentially to natural food. I may add that, in a similar manner, the lower animals can be taught to take ether and to crave for it.

Some years ago, when I was giving lectures on the

action of anæsthetic vapours, I had a pigeon which would walk into the anæsthetising chamber of its own accord as readily as it would go into its cage or climb on to its perch, and which would compose itself to the anæsthetic sleep at once with the most perfect equanimity. To the lookers-on this proceeding of the bird was a cause of astonishment and sometimes amusement. The truth, however, was that the animal in question had acquired a liking and craving for the anæsthetic vapours. Like all regular toppers, it had its particular tastes, and preferred the vapour of methylene bichloride to that of ethylic ether or amylene. But in the absence of one vapour it would always put up with another ; and whenever it was brought near the etherising box it would fly to it and get into it as quickly as it could, and the more eagerly if any odour of vapour were diffused in it. I give this as one illustration because it was so distinctly marked, and will be so well remembered by many who attended my demonstrations. It is, nevertheless, only one of its kind, and it is not exceptional beyond the novelty of first seeing it or hearing of it. There is no domestic animal, I believe, that could not be taught to acquire the craving for intoxicating vapours and intoxicating fluids.

Haply some hoary-headed swain may say that these facts about craving for intoxicants are proofs direct

that all the living creation craves for stimulants, and that stimulants therefore, are a part of the necessities of life. The argument in its application to men is often used because it is rather a convenient argument than a logical. If the craving were really a natural act, 'the interpretation of an instinct,' as one wise man has defined it, then it seems to me that natural law in this matter is an exceptionally confused and contradictory law, something nearer human than anything else that can be found in other parts of the domain of nature. If it be natural to crave for these things, why does not the craving begin before the things are known, and why should the craving be extended towards substances which none but persons advanced in knowledge could ever possess? The craving after ether, for example, when it has once been excited, may be as urgent in an unlettered peasant who does not even know that there is such a science as chemistry, as it would be in a learned chemist who knows that in order to produce an ether he must first produce an alcohol, a strong acid, and an elaborate apparatus, for the discovery of which some centuries of research must needs have intervened between the craving for it and its gratification. Nay, the craving when it has been excited may be as urgent in a lower animal as in the unenlightened peasant or the wise philosopher.

All things that are truly natural are naturally provided, and there is not a single natural necessity that is not naturally and bountifully supplied. We can modify all these and create a craving for the modification. We can modify the air so that what we breathe produces a different mode of existence; and for that very modification we can create such a craving, that the greatest of philosophers and the poorest of lower animals may long for the new life, and feel such an irresistible desire to breathe the new life, that whenever the mere means for accomplishing that desire are suggested, even by the sight of the means, the desire is all aglow. To my mind the evidence is conclusive that this craving, whenever it is indicated, is the crucial sign of aberration from nature; that it has no connection with the truly natural life, but is the interpretation of a morbid habit, acquired by man out of his own inventions, and communicable by man to other men and other animals lower than himself; that comparable in no sense with the divine schemes which he did not invent, it is as far apart from them and out of harmony with them, as it is far apart from his good and out of harmony with it. In a word, that whoever craves beyond his wants, whoever makes craving the object of his life, is aberrant—is no longer in the ranks of the survivals of the fittest; and in craving at all is craving for death.

❖ The history of ether-drinking which I have narrated is a singular phase of social life in this century, and as such alone is worthy of record. It is still more worthy of record as a study of life under aberration; of the extent to which man can indulge in the freedom of his own inventions; of the desires he can gratify by his own inventions; and, of the end and result of the gratification. It, with much more that is akin to it, tells us that, free as we are when we are running in concert with Nature, we are stopped whenever we try to go our own way; that so soon as we strive to make a nature of our own, or to alter the bases of Nature, so soon are we landed on the impossible; that if we try to invent no more than a change of dreams, fascinating as may be the attempt, we must, in the process, either become unintelligible one to the other or sink into the universal silence.

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